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Revision of *Tuxedo* Schuh (Hemiptera: Miridae: Phylinae)

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ABSTRACT

Tuxedo Schuh is revised. Seven valid species are recognized, three of those being described as new. *Tuxedo minor* (Knight) is treated as a junior synonym of *Tuxedo bicinctus* (Van Duzee), new synonym. Habitus photographs, illustrations of male genitalic structures, and scanning micrographs of morphological structures are provided. Extensive host and distributional information is provided for all species.

INTRODUCTION

The group treated in the present paper was recognized (Schuh, 2001) to contain a group of species restricted to western North America. Whereas *Tuxedo* Schuh was originally described as a way of assigning names previously proposed in *Plagiognathus* Fieber or its junior synonyms, in the present paper the taxonomy of the group is presented in detail. Schuh (2001) speculated that there might be 12 or more species; however, after more detailed analysis, only seven are here recognized. Schuh's generic diagnosis is also revised to reflect a more detailed examination of available material.

Unless noted otherwise, all scanning electron micrographs document male specimens. All measurements are in millimeters. A summary of measurements for all species is given in table 1.

TUXEDO SCHUH

Tuxedo Schuh, 2001: 251 (n.gen.).

TYPE SPECIES: *Chlamydatus bicinctus* Van Duzee, 1914.

DIAGNOSIS: Males recognized by the mostly castaneous, more rarely brownish, background coloration of the dorsum with the basal third of the cuneus always contrasting

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TABLE 1
Measurements of *Tuxedo* Species

Species		Length				Width			
		Total Body	Cun-Clyp	Head	Pronotum	Head	Pronotum	InterOcDi	AntSeg2
bicinctus									
M (N = 5)	**Mean**	**2.85**	**1.93**	**0.17**	**0.41**	**0.62**	**0.86**	**0.29**	0.75
	SD	0.07	0.08	0.02	0.03	0.01	0.05	0.01	0.03
	Range	0.16	0.18	0.05	0.05	0.04	0.12	0.02	0.08
	Min	2.76	1.84	0.14	0.39	0.60	0.79	0.27	0.70
	Max	2.92	2.02	0.19	0.44	0.64	0.91	0.3	0.78
F (N = 5)	**Mean**	**2.51**	**1.75**	**0.18**	**0.38**	**0.62**	**0.85**	**0.31**	**0.6**
	SD	0.09	0.07	0.03	0.03	0.02	0.03	0.02	0.03
	Range	0.22	0.15	0.06	0.06	0.06	0.08	0.06	0.07
	Min	2.4	1.67	0.16	0.36	0.58	0.82	0.28	0.58
	Max	2.62	1.82	0.23	0.42	0.64	0.9	0.34	0.64
drakei									
M (N = 5)	**Mean**	**3.14**	**2.12**	**0.18**	**0.48**	**0.73**	**1.02**	**0.30**	**0.88**
	SD	0.13	0.05	0.04	0.03	0.02	0.03	0.02	0.02
	Range	0.32	0.14	0.09	0.07	0.05	0.08	0.04	0.04
	Min	3.01	2.06	0.12	0.44	0.70	0.98	0.28	0.87
	Max	3.33	2.19	0.21	0.51	0.76	1.06	0.32	0.91
F (N = 5)	**Mean**	**3.07**	**2.16**	**0.2**	**0.48**	**0.72**	**1.02**	**0.35**	**0.6**
	SD	0.19	0.13	0.04	0.02	0.02	0.02	0.01	0.34
	Range	0.48	0.33	0.12	0.06	0.06	0.06	0.01	0.78
	Min	2.82	2	0.14	0.46	0.69	1	0.34	0
	Max	3.3	2.33	0.26	0.52	0.75	1.06	0.35	0.78
cruralis									
M (N = 5)	**Mean**	**2.97**	**1.99**	**0.17**	**0.42**	**0.63**	**0.89**	**0.27**	**0.76**
	SD	0.08	0.09	0.01	0.03	0.02	0.04	0.01	0.34
	Range	0.23	0.24	0.02	0.08	0.04	0.09	0.03	0.84
	Min	2.84	1.86	0.16	0.37	0.62	0.84	0.26	0.16
	Max	3.07	2.1	0.19	0.46	0.66	0.93	0.29	1.00
F (N = 5)	**Mean**	**3**	**2.16**	**0.23**	**0.47**	**0.69**	**1.02**	**0.38**	**0.79**
	SD	0.11	0.09	0.02	0.01	0.02	0.04	0.02	0.07
	Range	0.3	0.23	0.06	0.02	0.04	0.1	0.05	0.16
	Min	2.83	2.03	0.2	0.46	0.66	0.95	0.35	0.72
	Max	3.13	2.26	0.26	0.48	0.71	1.06	0.4	0.88
elongatus									
M (N = 5)	**Mean**	**3.6**	**2.26**	**0.19**	**0.41**	**0.61**	**0.85**	**0.25**	**0.96**
	SD	0.12	0.05	0.05	0.05	0.01	0.01	0.01	0.07
	Range	0.3	0.12	0.1	0.12	0.03	0.02	0.03	0.17
	Min	3.44	2.23	0.14	0.37	0.6	0.84	0.23	0.89
	Max	3.74	2.35	0.24	0.49	0.63	0.87	0.27	1.06
F (N = 5)	**Mean**	**2.61**	**1.72**	**0.18**	**0.42**	**0.62**	**0.81**	**0.3**	**0.67**
	SD	0.08	0.03	0.02	0.02	0.05	0.03	0.01	0.04
	Range	0.2	0.08	0.05	0.05	0.12	0.07	0.02	0.1
	Min	2.47	1.68	0.16	0.4	0.59	0.77	0.29	0.63
	Max	2.66	1.76	0.2	0.45	0.71	0.84	0.31	0.72
flavicollis									
M (N = 5)	**Mean**	**3.57**	**2.44**	**0.23**	**0.52**	**0.77**	**1.1**	**0.34**	**1.09**
	SD	0.22	0.16	0.03	0.06	0.04	0.09	0.02	0.07
	Range	0.52	0.39	0.07	0.14	0.09	0.2	0.05	0.17
	Min	3.32	2.33	0.2	0.47	0.73	1.01	0.32	0.99
	Max	3.84	2.71	0.27	0.62	0.82	1.21	0.37	1.16

TABLE 1
(Continued)

Species		Length				Width			
		Total Body	Cun-Clyp	Head	Pronotum	Head	Pronotum	InterOcDi	AntSeg2
flavicollis (continued)									
F (N = 5)	**Mean**	**3.33**	**2.34**	**0.25**	**0.54**	**0.76**	**1.15**	**0.39**	**0.86**
	SD	0.15	0.10	0.03	0.07	0.03	0.09	0.03	0.06
	Range	0.37	0.24	0.08	0.17	0.07	0.19	0.06	0.15
	Min	3.12	2.19	0.22	0.44	0.73	1.04	0.37	0.80
	Max	3.48	2.43	0.30	0.60	0.8	1.22	0.43	0.96
nicholi									
M (N = 5)	**Mean**	**2.97**	**1.99**	**0.17**	**0.42**	**0.63**	**0.89**	**0.27**	**0.76**
	SD	0.08	0.09	0.01	0.03	0.02	0.04	0.01	0.34
	Range	0.23	0.24	0.02	0.08	0.04	0.09	0.03	0.84
	Min	2.84	1.86	0.16	0.37	0.62	0.84	0.26	0.16
	Max	3.07	2.1	0.19	0.46	0.66	0.93	0.29	1.00
F (N = 5)	**Mean**	**2.81**	**1.91**	**0.2**	**0.44**	**0.66**	**0.93**	**0.33**	**0.69**
	SD	0.13	0.07	0.02	0.03	0.04	0.03	0.01	0.02
	Range	0.35	0.18	0.05	0.06	0.08	0.06	0.03	0.05
	Min	2.64	1.82	0.17	0.41	0.61	0.90	0.32	0.67
	Max	2.99	2.00	0.22	0.48	0.69	0.97	0.34	0.72
susansolomoni									
M (N = 7)	**Mean**	**3.14**	**2.08**	**0.22**	**0.46**	**0.68**	**0.93**	**0.3**	**0.91**
	SD	0.21	0.14	0.03	0.02	0.04	0.06	0.01	0.06
	Range	0.53	0.31	0.09	0.07	0.1	0.17	0.04	0.16
	Min	2.86	1.94	0.2	0.42	0.62	0.84	0.28	0.83
	Max	3.38	2.25	0.29	0.50	0.73	1.01	0.32	0.99
F (N = 7)	**Mean**	**2.94**	**2.03**	**0.19**	**0.49**	**0.70**	**0.99**	**0.35**	**0.74**
	SD	0.15	0.12	0.02	0.04	0.02	0.05	0.02	0.05
	Range	0.49	0.37	0.05	0.09	0.06	0.13	0.06	0.15
	Min	2.69	1.8	0.16	0.44	0.67	0.91	0.32	0.70
	Max	3.18	2.17	0.21	0.53	0.73	1.04	0.39	0.84

creamy white and frequently with a more or less complete creamy-white transverse fascia on the hemelytra near apex of scutellum (fig. 1). Sexual dimorphism moderate to very pronounced, male with elongate to long hemelytra, parallel-sided; females ovate (fig. 1). Antennal segment 2 sexually dimorphic, cylindrical and slightly enlarged in males, more slender and tapered toward base in females. Vesica in male (fig. 2) more or less J-shaped, very weakly twisted, with one or two variously ornamented spines apically; secondary gonopore close to apex.

Tuxedo spp. are most similar in type of sexual dimorphism (including antennae) to *Coniferocoris* Schwartz and Schuh (1999) and *Pinophylus* Schwartz and Schuh (1999). The pattern of coloration in *Tuxedo* is most similar to that of *Psallovius* Henry (1999) and *Ranzovius* Distant (1893). The sexual dimorphism (including antennae) in *Ranzovius* is unique and unlike any of the genera here compared with *Tuxedo*. The structure of the male genitalia in *Tuxedo* is closest to that of *Coniferocoris* spp., but is also similar to that of *Pinophylus* spp., *Psallovius* spp, and *Ranzovius* spp. Whereas *Coniferocoris* spp. and *Pinophylus* spp. are restricted to the Pinaceae, and *Ranzovius* spp. are commensal in spider webs, all known species of *Tuxedo* breed on angiosperms.

REDESCRIPTION: *Male:* Macropterous, of small to relatively large size, elongate, nearly parallel-sided; range total length 2.69–3.74, range length apex clypeus–cuneal fracture 1.84–2.39. COLORATION (fig. 1): Dorsum



Fig. 1. Habitus views of *Tuxedo* spp. See appendix 1 for localities.

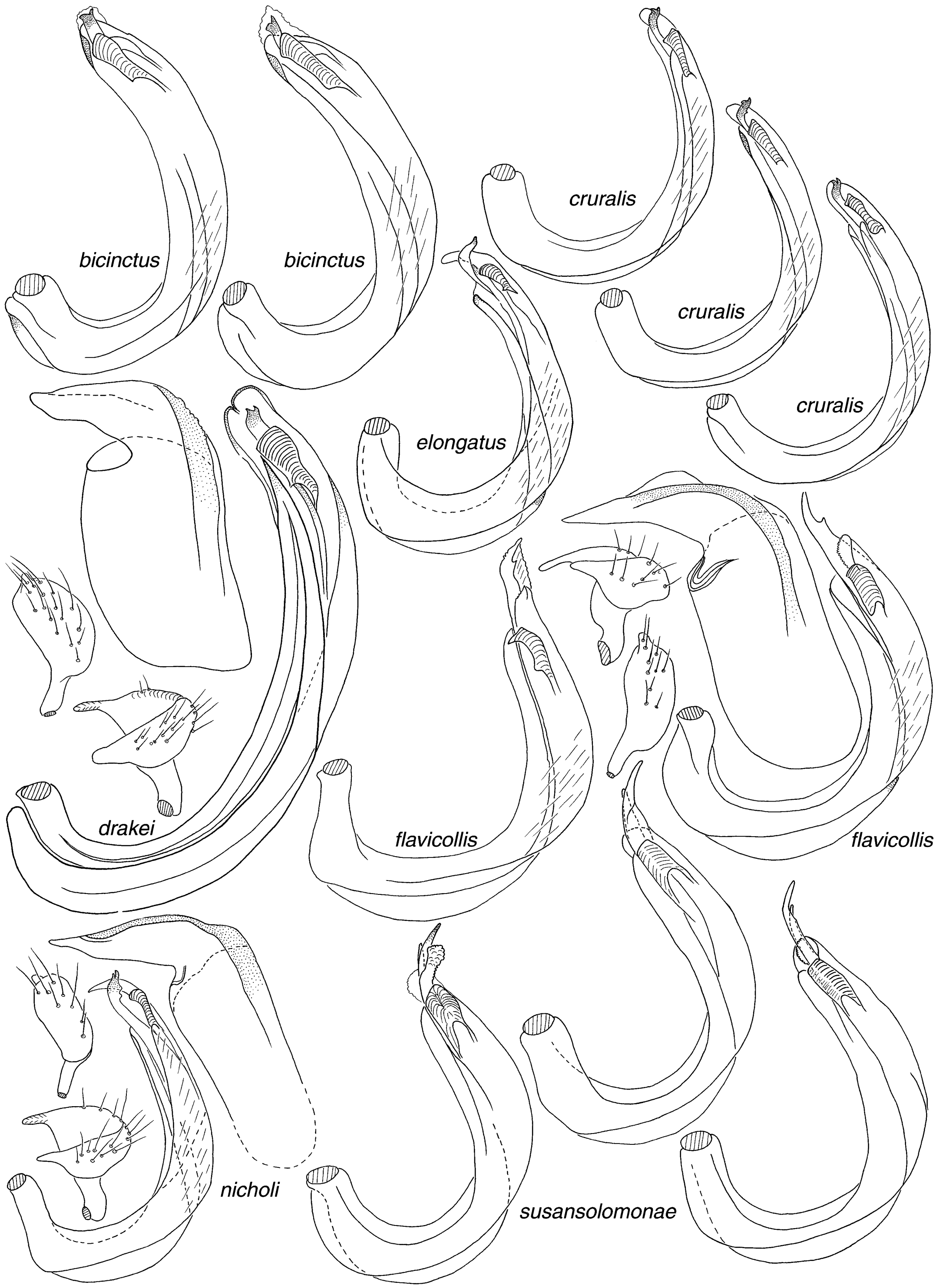


Fig. 2. Male genitalia of *Tuxedo* spp. See appendix 1 for localities.

reddish or castaneous, with distinctive contrasting white or cream-colored maculae on cuneus and frequently on corium and cuneus, the transverse corial fascia just posterior to apex of scutellum. SURFACE AND VESTITURE (figs. 1, 3G, H, 4F, 5F): Dorsal body surface smooth, impunctate, polished, weakly to moderately shining. Dorsal vestiture of recumbent, simple, often shining setae; distal portion of dorsal surface of hind femur lacking row of spinules (fig. 5G). STRUCTURE: Head short, closely conforming to anterior margin of pronotum; posterior margin of vertex weakly elevated and rounded (figs. 3C, 4C, 5C); frons barely protruding beyond anterior margin of eyes; eyes large, head only slightly projecting below their ventral margin; antennae inserted just above ventral b margin of eyes (figs. 3A, 4A, 5A); antennal segment 2 cylindrical, not tapered, about the same diameter as antennal segment 1; labium reaching to about apex of hind coxae; claws elongate, smoothly curving, pulvilli small, located near base of claws, parempodia relatively short, setiform (figs. 3E, 4E, 5E); mesothoracic spiracle and metathoracic scent-efferent system as in figures 3D, 4D, and 5D; femoral trichobothria as in figure 4H; abdomen slender, genital capsule relatively small; sometimes ventral and posterior surface of genital capsule with a field of short, thickly set, peglike setae (fig. 5H). GENITALIA (fig. 2): Vesica more or less J-shaped, very weakly twisted, apically with one or two short spines; secondary gonopore very close to apex of vesica; phallotheca with apical portion elongate and slender, at nearly right angle to body of structure (figs. 3F, 4G); left paramere boat-shaped; right paramere lanceolate, with a nipplelike apex.

Female: Small to moderately robust, elongate ovoid; range total length 2.40–3.48, range length apex clypeus–cuneal fracture 1.67–2.43. COLORATION (fig. 1): Pattern of coloration often similar to male, but frequently showing sexual dimorphism, especially in coloration of antennal segments 1 and 2. SURFACE AND VESTITURE: As in male. STRUCTURE: Body form more compact than in male; submacropterous, hemelytra just covering abdomen; eyes smaller than in male, frons more prominently bulging anterior to eyes, head projecting below eyes by about one-third height of eye (figs. 3B, 4B, 5B); antennal segment 2 more slender than in male, tapering toward base.

HOSTS: Most *Tuxedo* spp. breed on *Ceanothus* spp. (Rhamnaceae), *Cercocarpus* spp. (Rosaceae), or *Quercus* spp. (Fagaceae), with a single species known from *Fremontodendron* spp. (Sterculiaceae). All other recorded hosts occur with much lower frequency; some certainly do not represent breeding records.

DISTRIBUTION: Southern British Columbia, Canada, in the north, south to northern Baja California, Mexico, and east to western Colorado and New Mexico.

DISCUSSION: Schuh (2001) noted the similarity in coloration of *Tuxedo* spp. with species of *Sejanus* Distant from the Indo-West Pacific (see Schuh, 1984), suggesting by way of implication a possible placement it the Leucophoropterini. As mentioned in the diagnosis, the form of the male genitalia in *Tuxedo* is very similar to that of species placed in *Coniferocoris* and also has many similarities with that of *Psallovius* and *Ranzovius*. The type of sexual dimorphism is very similar to that of *Coniferocoris* and *Pinophylus*, although the genitalia of *Pinophylus* are not so similar to those of *Tuxedo* as are those of *Coniferocoris*, *Psallovius*, and *Ranzovius*.

Henry (1999) compared *Psallovius* and *Ranzovius*, treated the two as sister groups, and provided a phylogenetic analysis. *Coniferocoris*, *Pinophylus*, and *Tuxedo* were not documented at that time, but it would appear that the five genera may well form a monophyletic group based on the pattern of coloration and the form of the male genitalia. Henry (1999) rooted his tree with what he referred to as a ''*Plagiognathus* like'' ancestor. Henry (1999) assumed that *Psallovius* and *Ranzovius* were members of the Phylini. The issue of whether they are members of the Phylini or the Leucophoropterini (as implied by Schuh) is a subject that could benefit from a more broad-based analysis, something that I do not propose undertaking at the present time.

All diagnoses in the present paper are written as applying only to male specimens. A key to the males is provided. The process of identifying females is best conducted through

association with males. The reasons are that whereas the males of three of the known species have dark-colored antennae, all species but *cruralis* have pale antennae in the females, offering much less variation with which to discriminate the taxa. The coloration of the femora will assist in the descrimination of females of some species.

Key to Males of *Tuxedo*

1. Antennal segments 1 and 2 black, or nearly so; hemelytra with or without transverse fascia 2
— Antennal segment 2 pale, segment 1 also usually pale; if segments 1 and 2 not entirely pale then never black; hemelytra always with a partial to complete pale, transverse fascia at level of apex of scutellum . . . 4
2. Clavus uniformly dark, never with a pale marking at level of apex of scutellum, or if with a faint marking then all femora and tibiae distinctly infuscate 3
— Clavus with at least a faint pale area at level of apex of scutellum, this area often heavily contrasting with dark background coloration of hemelytra; fore- and middle femora and tibiae always pale; Oregon to Arizona; breeds on *Quercus* spp *susansolomonae*, new species
3. At least basal area of corium of paler coloration than remainder, sometimes much of corium pale, but hemelytra never with a pale, median, transverse fascia; all femora entirely infuscate; small to medium-sized species; widely distributed from British Columbia south to Baja California and east to Colorado and New Mexico; breeds primarily on *Ceanothus* spp. and *Cercocarpus* spp. . . . . *cruralis* (Van Duzee)
— Corium and clavus uniformly dark, clavus occasionally with a limited pale area near apex of scutellum; femora infuscate only on distal half; large, heavy bodied species; central California, eastern Washington; breeds on *Quercus* spp. . . . . *flavicollis* (Knight)
4. Elongate slender species, ratio of length to width 4.2:1; northern California to Arizona; on Fagaceae *elongatus*, new species
— Not so elongate, ratio of length to width never more than 3.30:1 5
5. Coloration of dorsum generally uniformly castaneous or reddish brown except for cream-colored base of cuneus and pale transverse fascia at apex of scutellum 6
— Coloration of dorsum variably brown to pale, with weakly to moderately contrasting markings at base of cuneus and as transverse fascia at apex of scutellum; Arizona, southern California; breeds on *Quercus* spp. . . . . *nicholi* (Knight)
6. Hind femur entirely castaneous; smaller species, length 2.76–2.92, width pronotum 0.79–0.91; transverse fascia at apex of scutellum only weakly developed on corium; vesica in male as in figure 2; California, Oregon, Nevada; breeds on *Ceanothus* spp. and *Cercocarpus* spp. . . . . *bicinctus* (Van Duzee)
— Hind femur castaneous on distal one-half, pale proximally; larger species, length 3.01–3.22, width pronotum 0.98–1.06; transverse fascia at apex of scutellum fully developed on clavus and corium; vesica in male as in figure 2; southern California; breeds on *Fremontodendron californicum* . . . . *drakei*, new species

Tuxedo bicinctus (Van Duzee)
Figures 1–3

Chlamydatus bicinctus Van Duzee, 1914: 30 (n.sp.).
Microphylellus minor Knight, 1929: 42 (n.sp.). NEW SYNONYMY.
Microphylellus bicintus: Pinto, 1982: 102–109 (host, phenology).
Tuxedo bicinctus: Schuh, 2001: 252 (n.comb.).

Lectotype: *Chlamydatus bicinctus* Van Duzee (here designated): Male: [USA:] ‘‘San Diego, Calif., V-6–1913, EP Van Duzee’’. Deposited in the California Academy of Sciences.

Holotype: *Microphylellus minor* Knight: Male: ‘‘Fresno, Calif., June 20, 1926, C. J. Drake.’’ Deposited in the National Museum of Natural History, Washington, D.C.

Diagnosis: Recognized by the very small size in combination with the pale antennae, the cream-colored fascia across the hemelytra somewhat weakly developed on the corium, the entirely castaneous hind femora, and the habit of breeding on *Ceanothus* spp. and *Cercocarpus* spp. Most similar in appearance to *T. drakei* and *T. susansolomonae*, but distinguished from *drakei* by the hind femur in that species being castaneous only on the distal half, and from both by their slightly to significantly larger size, as well as different host preferences. Vesica in male also distinctive, with a single, short, bifid

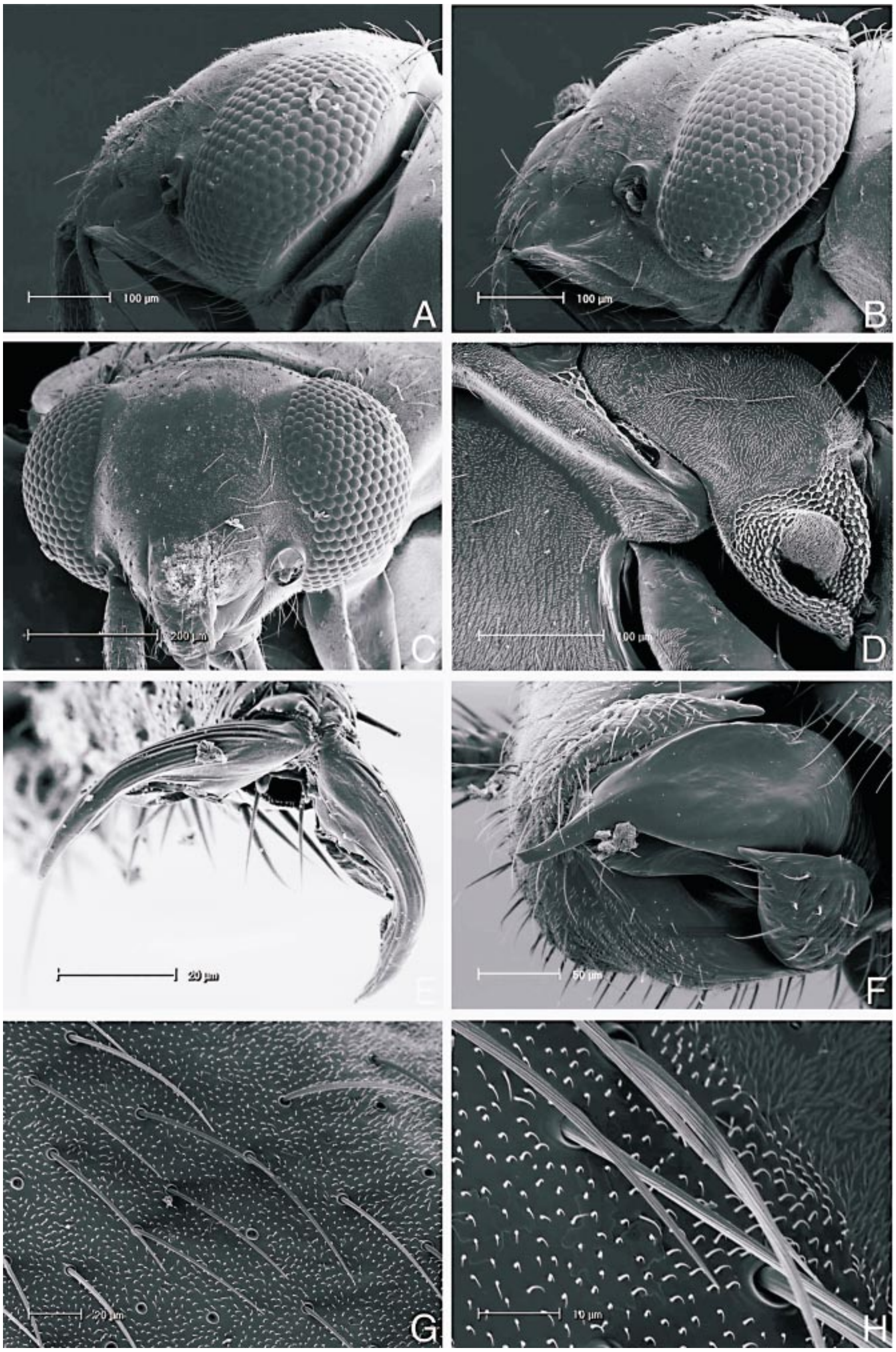


Fig. 3. Scanning electron micrographs of *T. bicinctus* from USA: Oregon: Harney Co.: Malhuer National Forest (♂) and USA: Oregon: Harney Co.: 11 mi E of French Glen (♀). **A.** Head, ♂, lateral view. **B.** Head, ♀, lateral view. **C.** Head, ♂, anterior view. **D.** Mesothoracic spiracle and metaepisternal scent efferent system, lateral view. **E.** Pretarsus, frontal view. **F.** Genital segment, dorsal view of left paramere, phallotheca, and right paramere. **G.** Setae on hemelytra. **H.** Setae on hemelytra, detail of microstructure. Scales as indicated.

apical spine very similar to that found in *drakei*, but readily distinguished from that species through comparison of the overall conformation of the vesica.

REDESCRIPTION: *Male:* Small; total length 2.76–2.92, length apex clypeus–cuneal fracture 1.84–2.02, width pronotum 0.79–0.91. COLORATION (fig. 1): Background coloration castaneous; basal one-third to one-half of cuneus creamy white; clavus always with a rounded pale area just posterior to apex of scutellum, sometimes more extensive and nearly parallel-sided and extending onto adjacent corium and forming a more-or-less continuous, pale, transverse fascia reaching to the R-M vein; antennal segments 1 and 2 usually entirely pale, segments 3 and 4 appearing darker; labial segments 2 and 3 pale; all coxae, fore- and middle femora, and all tibiae pale; hind femora entirely castaneous. SURFACE AND VESTITURE (fig. 1, 3G, H): Pronotum moderately shining, remainder of dorsum weakly shining. STRUCTURE: Body appearing somewhat flattened; head as in figure 3A, C; meso- metathoracic pleuron as figure 3D; claws as figure 3E. GENITALIA (figs. 2, 3F): Body of vesica relatively stout in comparison to most other *Tuxedo* spp., most similar to *Tuxedo drakei*, but shorter and with basal region more strongly curving than in that species; vesica with a single, bifid apical spine extending only short distance beyond secondary gonopore and envelope of vesica, of form very similar to that of *T. drakei*; apical vesical spine in *T. cruralis* also of similar appearance, but longer and curving, and vesica not so stout as in that species.

Female: Small; total length 2.40–2.62, length apex clypeus–cuneal fracture 1.67–1.82, width pronotum 0.82–0.90. COLORATION (fig. 1): As in male, except transverse fascia at apex of scutellum always broad and intense on clavus and most frequently complete and extending to and including costal vein. SURFACE AND VESTITURE: As in male. STRUCTURE (fig. 3B): As in generic description.

HOSTS: *Ceanothus* spp. (Rhamnaceae) and *Cercocarpus* spp. (Rosaceae). Also recorded from *Phoradendron* spp., although this may not be a breeding host.

DISTRIBUTION: Central Oregon and southern Idaho south to San Diego County, California, and east to southern Utah.

DISCUSSION: Van Duzee (1914) described *Chlamydatus bicinctus* from ‘‘numerous specimens taken on *Ceanothus* in the spring, March to June’’. I have examined 4 male and 15 female specimens collected by Van Duzee; one male is labeled lectotype, one female as allotype, the remainder being labeled as paratypes. The ‘‘type’’ labels were apparently placed on the specimens by Van Duzee subsequent to the publication of the description of the taxon, but my research suggests that no lectotype designation was ever published. I am therefore formally designating the male specimen from the California Academy of Sciences bearing a red lectotype label as the actual lectotype for this species.

Knight (1929) indicated that C. J. Drake had collected the nominal species *bicinctus* Van Duzee and *minor* Knight on different hosts at the same locality at Fresno, California. According to Knight, his species *minor* was smaller, with a more porrect head, and with the tylus projecting distinctly forward, and with the vertex also somewhat wider than in *bincinctus*. It is my view that Knight was certainly correct that Drake had collected two species at Fresno on June 20, 1926. Knight, however, did not make it clear how he fixed the identity of *bicinctus*. Neither did he say how it was that he knew that Drake had collected what he thought were different species of bugs on different plants. The specimen labels contain no such information and there is no chance that two species of this genus could be distinquished as different in the field except by the fact that they occupied different hosts. I have compared the Van Duzee material of *T. bicinctus* mentioned above with the holotype and allotype of *minor* and conclude that the species Knight identified as *bicinctus* is actually undescribed, and that his species *minor* is actually *bicinctus*, and therefore a junior synonym. The identity of *bicinctus* sensu Knight is discussed below under *Tuxedo drakei*, new species.

Pinto (1982) described the phenology of *T. bicinctus* on *Ceanothus crassifolius* at a site in Riverside County in southern California.

SPECIMENS EXAMINED: USA: **California:** *Alameda Co.:* Oakland, June 1, 1935, E. S.

Ross, 1♂, 2♀ (CAS). *Butte Co.:* Oroville, May 1, 1925, H. H. Keifer, *Ceanothus cuneatus* (Rhamnaceae), 5♂, 2♀ (CAFA, CAS). *Fresno Co.:* Fresno, June 20, 1926, C. J. Drake, 1♀ (CNC). Fresno, June 29, 1926, C. J. Drake, 1♂, 2♀ (USNM). *Humboldt Co.:* Beatrice, June 30, 1940, B. P. Bliven, 2♂ (CAS). Blocksburg, June 24, 1951, B. P. Bliven, 1♂ (CAS). Bridgeville, June 20, 1959, Kelton and Madge, 1♂ (CNC). Carlotta, July 23, 1967, 1♂ (CAS). McCann, July 19, 1959, Kelton and Madge, 1♂ (CNC). Redcrest, July 8, 1973, B. P. Bliven, 1♂ (CAS). *Kern Co.:* 20 km W of Wofford Heights on Rt 155, 1500 m, July 26, 1999, M. D. Schwartz, *Cercocarpus betuloides* (Rosaceae), 3♀ (CNC). 7 mi W of Wofford Heights on Rt 155, 1520 m, June 26, 1999, M. D. Schwartz, *Arctostaphylos* sp. (Ericaceae), 1♀ (CNC). near Kernville, Headquarters Camp, Sequoia National Forest, June 18, 1993, W. F. Chamberlin, 1♀ (TAMU). *Lassen Co.:* 9 mi W of McArthur, 1280 m, July 6, 1979, R. T. and Joe Schuh, *Cercocarpus betuloides* (Rosaceae), 2♂, 2♀ (AMNH). Blue Lake, July 19, 1947, R. L. Usinger, 1♀ (UCB). *Los Angeles Co.:* Claremont, C. F. Baker, 1♂ (HELSINKI). Flintridge, May 10, 1955, C. L. Hogue, 1♂ (LACM). Los Angeles, April 1, 1900, Koebele, 1♀ (CAS). Pasadena, June 5, 1909, Grinnell, 1♀ (CAS). *Marin Co.:* Mt. Tamalpais, June 28, 1918, *Mariposa Co.:* Yosemite National Park, Glacier Point, 7214 ft, July 3, 1946, H. P. Chandler, 1♂ (CAS). *Medera Co.:* Coarsegold, June 29, 1946, R. L. Usinger, *Phoradendron* sp.(Loranthaceae), 5♀ (UCB). *Mendocino Co.:* Eel River R.S., Mendocino National Forest, June 12, 1972, J. Doyen, *Cercocarpus betuloides* (Rosaceae), 7♀ (UCB). *Modoc Co.:* Fandango Pass Summit, Warner Mts., 1890 m, July 3, 1979, R. T. Schuh and B. M. Massie, *Cercocarpus ledifolius* (Rosaceae), 10♂, 17♀ (AMNH). *Monterey Co.:* Bryson, April 14, 1917, E. P. Van Duzee, 1♀ (CAS). *Napa Co.:* Soda Creek, May 3, 1931, H. H. Keifer, *Cercocarpus* sp. (Rosaceae), 4♂ (CAFA). *Orange Co.:* 1.5 mi E of San Juan Campground, Cleveland Natl. Forest, May 12, 1978, J. D. Pinto and R. T. Schuh, 1♂ (AMNH). *Riverside Co.:* Menifee Valley (hills on W end), 1800 ft, April 29, 1979–May 22, 1979, J. D. Pinto, *Ceanothus crassifolius* (Rhamnaceae), 29♂, 32♀ (UCR). Pinon Flat, San Jacinto Mts., May 21, 1940, R. L. Usinger, *Phoradendron juniperinum* (Loranthaceae), 1♂, 4♀ (UCB). San Jacinto Mountains, jct of Poppet Flat Rd and Rt 243, 1270 m, May 20, 2000, M. D. Schwartz, *Cercocarpus* sp. (Rosaceae), 4♂ (CNC). SE of Murietta, road to Tenaja Fire Station, 1500 ft, May 13, 1978, J. D. Pinto, 1♀ (UCR). Tenaja Road W of Murietta, 410 m, May 12, 1978, J. D. Pinto and R. T. Schuh, *Ceanothus crassifolia* (Rhamnaceae), 15♂, 14♀ (AMNH). *San Bernardino Co.:* Cajon Pass, jct Rts I-15 and 138, 1030 m, May 2, 1985, R. T. Schuh and B. M. Massie, *Cercocarpus betuloides* (Rosaceae), 7♂ (AMNH). Lytle Creek, June 8, 1928, E. P. Van Duzee, 1♂ (CAS). *San Diego Co.:* Laguna Mts., Kitchen Creek Rd 1.4 mi N of Rt 8, 1100 m, May 21, 2000, M. D. Schwartz, *Ceanothus* sp. (Rhamnaceae), 1♂, 2♀ (CNC). No specific locality, March 29, 1914–June 1, 1914, E. P. Van Duzee, paratypes: 1♂, 11♀ (CAS). San Diego, May 17, 1913, W. S. Wright, 1♂, 3♀ (CAS). Tecate Peak, 1885 ft, June 2, 1980, Brown and Faulkner, 2♂ (SDNH). *San Luis Obispo Co.:* 10.5 mi SE of Santa Margarita, May 16, 1980, J. D. Pinto, 1♀ (UCR). Arroyo Grande Creek SW of San Luis Obispo, 160 m, May 8, 1985, R. T. Schuh and B. M. Massie, *Ceanothus cuneatus* (Rhamnaceae), 2♂ (AMNH). *San Mateo Co.:* Lake Pilarcitos, June 25, 1966, C. W. O’Brien, 7♂, 7♀ (UCB). *Santa Barbara Co.:* Santa Cruz Island, Can del Medio, April 28, 1969, D. S. Horning, 1♂ (UCD). Upper Oso Campground off Rt 154, 310 m, May 7, 1985, R. T. Schuh and B. M. Massie, *Cercocarpus betuloides* (Rosaceae), 2♂, 10♀ (AMNH). *Shasta Co.:* 1 mi E of Montgomery Creek, May 27, 1968, R. M. Brown, 1♀ (CAS). 7.6 mi N of Manton, 1138 m, July 10, 1980, R. T. Schuh and G. M. Stonedahl, *Cercocarpus alnifolius* (Rosaceae), 2♀ (AMNH). Hat Creek P.O., June 20, 1955, J. W. McSwain, 1♂, 6♀ (UCB). Paynes Creek, June 18, 1959, Kelton and Madge, 9♀ (CNC). *Siskiyou Co.:* 2 mi SE of Lava Beds Natl. Monument, 5000 ft, June 26, 1979, M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 3♂, 5♀ (OSU). Lava Beds Natl. Monument near Headquarters, 1560 m, June 26, 1979, R. T. and Joe Schuh, *Cercocarpus ledifolius* (Rosaceae), 2♂, 10♀ (AMNH). McCloud, July 23, 1918, E. P. Van Duzee, 1♀ (CAS). Medicine Lake

Road, 4800 ft, June 26, 1979, G. M. Stonedahl, *Cercocarpus ledifolius* (Rosaceae), 9♀ (OSU). Sisson, July 25, 1918, E. P. Van Duzee, 1♂, 4♀ (CAS). **Idaho:** *Owyhee Co.:* Silver City, 6200 ft, July 8, 1973, P. W. Oman, 1♂ (OSU). **Nevada:** *Clark Co.:* Charleston Peak, July 21, 1982, J. T. Polhemus, *Cercocarpus* sp. (Rosaceae), 2♂, 7♀ (JTP). **Oregon:** *Grant Co.:* Malheur National Forest, T14S R33E Sec 15, July 21, 1979, M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 5♂, 8♀ (AMNH). *Harney Co.:* 11 mi E of Frenchglen, 6000 ft, July 16, 1957, J. D. Lattin, *Cercocarpus* sp. (Rosaceae), 4♂, 18♀ (OSU). *Klamath Co.:* 28 mi SE of jct Rts 97 and 31, 4910 ft, July 25, 1979, M. D. Schwartz and G. M. Stonedahl, *Cercocarpus ledifolius* (Rosaceae), 6♂, 3♀ (AMNH). 28 mi SE of jct Rts 97 on Hwy 31, 4910 ft, July 25, 1979, M. D. Schwartz, G. M. Stonedahl, *Cercocarpus ledifolius* (Rosaceae), 6♂, 5♀ (OSU). Base of Bly Mountain, June 25, 1961, Joe Schuh, *Cercocarpus ledifolius* (Rosaceae), 1♀ (AMNH). *Lake Co.:* 24 mi SE of LaPine, T24S R13E Sec. 24, July 12, 1957, G. F. Kraft, *Cercocarpus ledifolius* (Rosaceae), 1♀ (OSU). *Wheeler Co.:* 4.5 mi S of Mitchell on Summit Prairie Road, June 22, 1979, R. T. Schuh, *Cercocarpus ledifolius* (Rosaceae), 1♀ (AMNH). 4.5 mi S of Mitchell on Summit Prairie Road, June 27, 1979, M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 2♂ (OSU). **Utah:** *Grand Co.:* 11 mi SE of Rt 163 toward Dead Horse Point on Rt 313, 5200 ft, June 11, 1982, M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 1♂, 1♀ (AMNH).

Tuxedo cruralis (Van Duzee)
Figures 1, 2, 4

Plagiognathus diversus cruralis Van Duzee, 1917: 283 (n.var.).
Psallus breviceps: Pinto, 1982: 102 (host record, phenology).
Tuxedo cruralis: Schuh, 2001: 252 (n.comb.).

HOLOTYPE: *Plagiognathus diversus cruralis* Van Duzee: Male: [USA]: ‘‘Tunnel Road, Alameda Co., Cal., # 1, 13-V-17, W. M. Giffard Collector’’. Deposited in the California Academy of Sciences.

DIAGNOSIS: Distinctive among *Tuxedo* species in having all of the femora entirely infuscate. Most similar to *T. flavicollis* and *T. susansolomonae* in the dark coloration of the antennae in the males, but those species with the femora pale at least basally; differing from *susansolomonae* by the partial to complete, pale, transverse fascia on the hemelytra posterior to the apex of the scutellum in that species; differing from *flavicollis* by that species having the base of the corium entirely dark.

DESCRIPTION: *Male:* Relatively small to medium-sized; total length 2.77–3.15, length apex clypeus–cuneal fracture 1.91–2.17, width pronotum 0.84–0.95. COLORATION (fig. 1): Background coloration brownish black, rarely lighter; basal one-third to one-half of cuneus creamy white, corium frequently pale at extreme base, pale area sometimes more extensive, rarely entending onto basal area of clavus; all antennal segments black; labial segments 2 and 3 pale; all coxae pale, all femora and tibiae infuscate. SURFACE AND VESTITURE (figs. 1, 4F): Pronotum weakly to moderately shining, remainder of dorsum weakly shining. STRUCTURE: Body weakly cylindrical in cross section, appearing somewhat flattened when viewed from above; head as in figure 4A, C; meso- and metathoracic pleura as figure 4D; femoral trichobothria as in figure 4H; claws as figure 4E. GENITALIA (figs. 2, 4G): Body of vesica relatively slender; vesica with a single, bifid apical spine extending well beyond secondary gonopore and envelope of vesica, of form similar to that of *T. bicinctus* and *T. drakei*, but spine longer and distinctly curving, unlike condition in those species.

Female: Relatively small to medium-sized; total length 2.83–3.13, length apex clypeus–cuneal fracture 2.03–2.26, width pronotum 0.95–1.06. COLORATION (fig. 1): Infrequently, as in male, dorsum largely dark with contrasting pale base of cuneus and base of corium weakly pale; more frequently dorsum partially to largely pale, but with calli, posterior half of corium, and distal half of cuneus dark brown and contrasting with remainder. SURFACE AND VESTITURE: As in male. STRUCTURE (fig. 4B): As in generic description.

HOST: Collected most frequently breeding on *Ceanothus* spp. (Rhamnaceae), less frequently on *Cercocarpus* spp. (Rosaceae). Also known from *Quercus* spp. (Fagaceae),

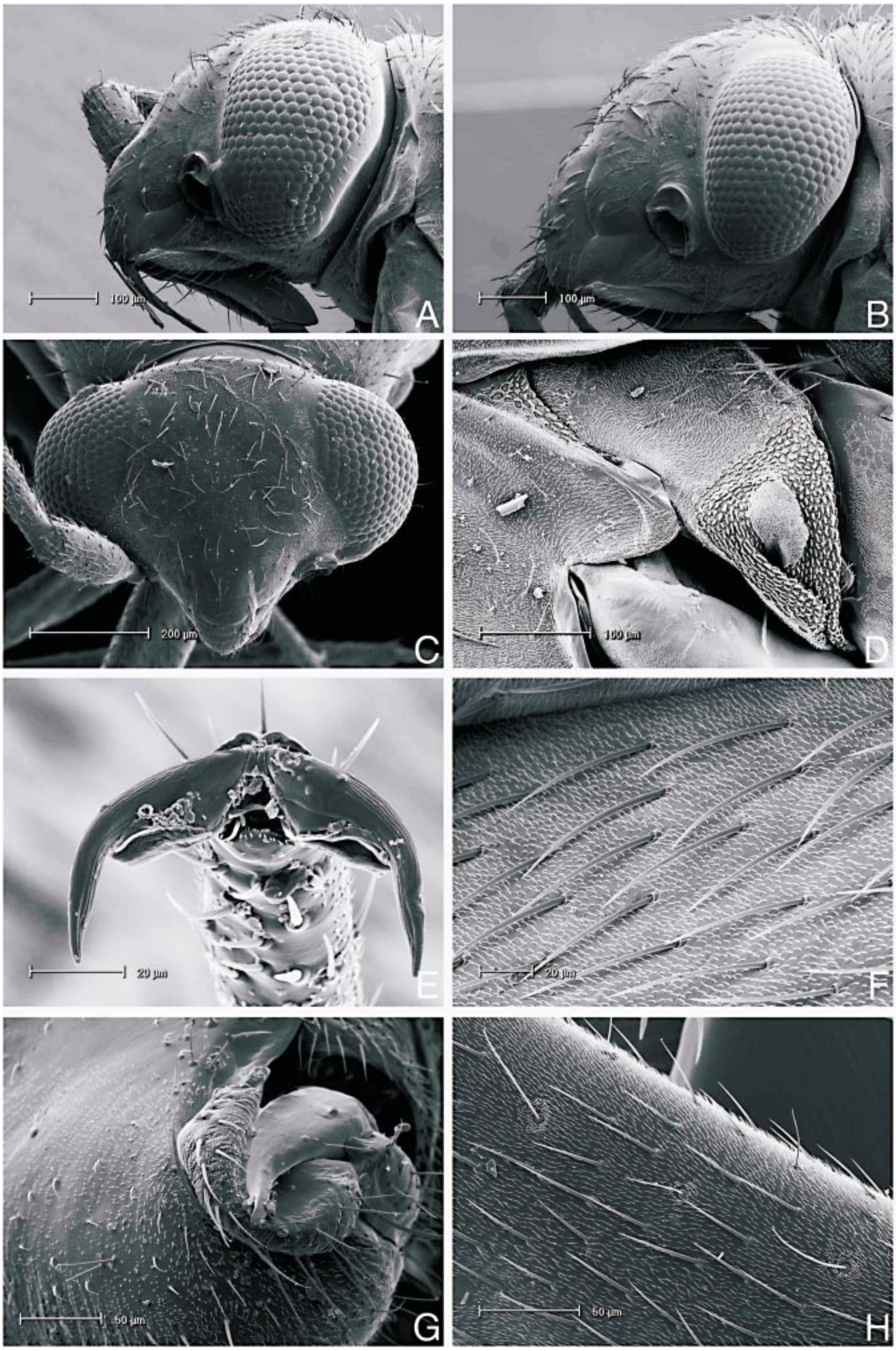


Fig. 4. Scanning electron micrographs of *T. cruralis* from USA: White Pine Co.: Wheeler Peak Road. **A.** Head, ♂, lateral view. **B.** Head, ♀, lateral view. **C.** Head, ♂, anterior view. **D.** Mesothoracic spiracle and metaepisternal scent efferent system, lateral view. **E.** Pretarsus, frontal view. **F.** Setae on hemelytra. **G.** Genital segment, posterior view of left paramere, phallotheca, and right paramere. **H.** Trichobothria on hind femur, lateroventral view. Scales as indicated.

Shepherdia sp. (Elaeagnaceae), *Prunus* sp. (Rosaceae), *Salix* sp. (Salicaceae), and *Simmondsia* sp. (Simmondsiaceae).

DISTRIBUTION: Southern British Columbia, Canada, in the north, south to northern Baja California, Mexico, and east to western Colorado and New Mexico.

DISCUSSION: As noted by Schuh (2001), this species was originally described as a variety of *Plagiognathus diversus* Van Duzee (= *Europiella artemisiae* (Becker)) by Van Duzee (1917). In an earlier paper Van Duzee (1914) used the name *Psallus breviceps* Reuter (1909), apparently in reference to *T. cruralis*; Van Duzee (1914) noted that Dr. Reuter apparently had two pale females before him when describing the species from Texas. Van Duzee's usage of the name *breviceps* seems to have been based solely on his reading of the literature, yet his indication that Reuter had examined two pale females contradicts information in the original description, where Reuter makes explicit reference only to the attributes of males and indicates that he had only two examples of the species, from "Texas". After correspondence with Herbert Zettel and I. M. Kerzhner, I have not been able to locate the specimens examined by Reuter, which were indicated as being deposited in the Naturhistorisches Museum in Vienna. This does not mean that they do not exist, but only that their identity has not yet been established. So, I am treating the name *Psallus breviceps* Reuter as a nomen dubium until such time as its identity can be verified.

Pinto (1982) also used the name *Psallus breviceps*, this time in explicit reference to *T. cruralis*. Pinto's usage was based on identifications provided by T. J. Henry. I am uncertain on whose ientification Henry's concept was based, for during the course of this study I have not located any specimens bearing identification labels reading "Psallus breviceps" written by Van Duzee, Henry, or any other author.

Even in the absence of Reuter's specimens, it seems quite certain that application of the name *Psallus breviceps* Reuter to what I am calling *Tuxedo cruralis* is in error. After extensive searching of existing collections from the western United States, and after having done extensive collecting in all of the western states, including western Texas, I have found no evidence to indicate that *T. cruralis* occurs in Texas. Thus, I am treating the use of *Psallus breviceps* by Van Duzee (1914) and Pinto (1982) as misidentifications.

This is the most widely distributed of the *Tuxedo* species and has been collected on the widest range of hosts, although is breeds most consistently on *Ceanothus* spp. and *Cercocarpus* spp.

SPECIMENS EXAMINED: CANADA: **British Columbia:** Oliver, Vaseaux Lake, June 26, 1959, L. A. Kelton, 1♀ (CNC). MEXICO: **Baja California Norte:** 1.5 km W of Parque Sierra San Pedro Martir, 2090 m, April 25, 1985, R. T. Schuh and B. M. Massie, *Ceanothus cuneatus* (Rhamnaceae), 3♂, 4♀ (AMNH). 12 mi SE of El Rosario, March 25, 1979, J. D. Pinto, *Simmondsia* sp. (Simmondsiaceae), 8♂, 16♀ (UCR). 13 mi N of Punta Prieta, March 26, 1979, J. D. Pinto, 1♀ (UCR). 2 mi W of Las Encinas, 5200 ft, March 18, 1972, J. Powell, *Ceanothus* sp. (Rhamnaceae), 1♂, 1♀ (UCB). 2 mi W of Las Encinas, Sierra San Pedro Martyr, 3600 ft, March 18, 1972, J. Doyen, *Ceanothus* sp. (Rhamnaceae), 3♂, 10♀ (UCB). 6 mi E of Ojos Negros, April 16, 1983, D. K. Faulkner, 1♂, 1♀ (SDNH). 7 mi SE of Maneadero, 100 ft, March 25, 1973, J. Doyen, 2♂, 2♀ (UCB). 7 mi W of Parque Sierra San Pedro Martir, 1720 m, April 25, 1985, R. T. Schuh and B. M. Massie, *Ceanothus cuneatus* (Rhamnaceae), 10♂, 10♀ (AMNH). 7 mi W of Parque Sierra San Pedro Martir, 1720 m, April 25, 1985, R. T. Schuh and B. M. Massie, *Ceanothus tomentosus* (Rhamnaceae), 7♂, 5♀ (AMNH). La Mission, Rio San Miguel, February 27, 1982, Brown and Faulkner, 1♂, 3♀ (SDNH). Las Encinas, Sierra San Pedro Martyr, May 25, 1980, Brown and Faulkner, 3♂, 4♀ (SDNH). Rancho El Progreso, March 25, 1979, E. M. Fisher, 1♀ (UCR). USA: **Arizona:** *Graham Co.:* Graham Mountains, Forest Road 808, T9S R25E, 5000 ft, April 25, 1982, M. D. Schwartz, *Ceanothus greggii* (Rhamnaceae), 2♂, 4♀ (AMNH). *Maricopa Co.:* Reavis Ranch Trail, 3600 ft, April 19, 1982, D. A. and J. T. Polhemus, *Quercus turbinella* (Fagaceae), 7♂, 5♀ (JTP). *Yavapai Co.:* 1 mi E of Yarnell, April 29, 1981, D. A. and J. T. Polhemus, *Cercocarpus betuloides* (Rosaceae), 30♂, 8♀ (JTP). **California:** *Al-*

ameda Co.: Berkeley, April 6, 1972, H. L. Jones, *Cercocarpus traskiae* (Rosaceae), 3♂, 3♀ (CAFA). Oakland, hills back of city, April 3, 1931, E. C. Zimmerman, 1♂, 5♀ (UCB). *Alpine Co.:* 4 mi SE of Markleesville, 8150 ft, June 19, 1966, W. Gagne, 1♂ (UCB). *Butte Co.:* Oroville, April 30, 1927, H. H. Keifer, *Salix hindsiana* (Salicaceae), 20♂, 18♀ (CAS). Oroville, April 30, 1927, H. H. Keifer, *Salix hindsiana* (Salicaceae), 1♂, 1♀ (CNC). Yankee Hill, May 8, 1928, H. H. Keifer, *Ceanothus cuneatus* (Rhamnaceae), 2♂ (CAS). *Calaveras Co.:* Mokelumne Hill, April 17, 1930, R. L. Usinger, 6♂, 8♀ (UCB). *Contra Costa Co.:* Moraga, May 13, 1977, R. F. Denno, 1♂ (UCD). *Humboldt Co.:* 2 mi S of Ettersburg, May 22, 1976, J. Hafernik, 1♂ (UCB). 3 mi E of Benbow, May 20, 1976, R. Dietz and J. Powell, 4♂, 7♀ (UCB). Beatrice, June 21, 1959, Kelton and Madge, 15♂, 10♀ (CNC). Beatrice, May 30, 1940, B. P. Bliven, 6♀ (CAS). Blocksburg, June 11, 1933–June 10, 1951, B. P. Bliven, 1♂ (CAS). Bridgeville, June 20, 1959, Kelton and Madge, 7♂ (CNC). Bridgeville, June 20, 1959, Kelton and Madge, *Ceanothus* sp. (Rhamnaceae), 6♀ (CNC). Dinsmores, June 25, 1939, B. P. Bliven, 3♂ (CAS). Garberville, May 5, 1940, B. P. Bliven, 2♂ (CAS). McCann, June 19, 1959, Kelton and Madge, 1♀ (CNC). Redway, May 15, 1938, B. P. Bliven, 1♂, 3♀ (CAS). Samoa, June 6, 1937, B. P. Bliven, 6♂, 7♀ (CAS). Shively, June 21, 1959, Kelton and Madge, 4♂, 7♀ (CNC). *Kern Co.:* 2.5 mi NNE of Caliente, April 28, 1978, J. D. Pinto, 1♂ (UCR). 4.5 mi E of Onyx, April 21, 1982, J. D. Pinto and R. K. Velten, *Ceanothus* sp. (Rhamnaceae), 4♀ (UCR). 5 mi N of Kernville, May 15, 1968, S. W. Earnshaw, 2♂, 4♀ (UCB). 7 mi W of Wofford Heights on Rt 155, 1520 m, June 26, 1999, May 18, 2000, M. D. Schwartz, *Ceanothus integerrimus* (Rhamnaceae), 11♀ (CNC). Havilah, April 28, 1978, J. D. Pinto, 3♂ (UCR). Lake Isabella, Main Dam Campground, April 24, 1980, M. D. Schwartz and L. Russell, *Ceanothus integerrimus* (Rhamnaceae), 2♀ (OSU). Tehachapi Mts., Antelope Canyon, 4800–5200 ft, May 15, 1976, J. D. Pinto, *Quercus turbinella* (Fagaceae), 2♂ (UCR). Walker Pass on Rt 178, 1600 m, May 18, 2000, M. D. Schwartz, *Ceanothus* sp. (Rhamnaceae), 14♂, 4♀ (CNC). Walker Pass, 5250 ft, May 30, 1981, J. T. Polhemus, 1♂ (JTP). *Lassen Co.:* Susanville, June 17, 1959, Kelton and Madge, 1♀ (CNC). *Los Angeles Co.:* Claremont, C. F. Baker, 1♂ (USNM). Devils Canyon, June 16, 1948, E. I. Schlinger, 1♂ (UCD). Malibu Canyon, February 27, 1966, 3♂ (LACM). Mt. Wilson trail, upper half, June 5, 1915, H. Morrison, 2♂ (USNM). Pasadena, June 5, 1909, Grinnell, 7♂, 7♀ (CAS). *Marin Co.:* Mill Valley, April 25, 1926, M. C. Van Duzee, 1♂, 1♀ (CAS). Phoenix Lake, May 14, 1927, H. H. Keifer, *Ceanothus sorediatus* (Rhamnaceae), 1♂, 4♀ (CAS). Ross, April 28, 1918, E. P. Van Duzee, 1♂ (CAS). Ross, April 28, 1918, J. C. Bradley, 1♂, 3♀ (CU). *Mendocino Co.:* 15 mi W of Laytonville, June 15, 1972, D. Veirs, 1♂ (UCB). 3 mi N of Branscomb, May 30, 1980, A. E. Hajek, 1♂ (UCB). Hopland Experiment Station, 2500 ft, May 23, 1971, C. B. Phillip, 1♂ (CAS). *Modoc Co.:* Fandango Pass Summit, Warner Mts., 1890 m, July 3, 1979, R. T. Schuh and B. M. Massie, *Cercocarpus ledifolius* (Rosaceae), 5♀ (AMNH). *Monterey Co.:* 6.5 mi S of Big Sur, April 30, 1977, A. J. Mayor, *Ceanothus* sp. (Rhamnaceae), 8♂, 8♀ (UCR). Chew's Ridge, 5100 ft, June 23, 1967, R. G. Denno, 1♂ (UCD). Palo Colorado Road, 8 mi SSE of Hiway 1, Ventural Wildlands Trail, April 20, 1980, M. D. Schwartz and L. Russell, *Ceanothus cuneatus* (Rhamnaceae), 12♂, 18♀ (OSU). *Napa Co.:* 2 mi NNE of Anguin, N side of Howell Mt., 1300 ft, May 1, 1986, H. B. Leech, 1♀ (CAS). 7 mi S of Pope Valley, April 24, 1971, J. Marsh, 1♂ (UCD). Soda Creek, May 3, 1932, H. H. Keifer, *Cercocarpus betuloides* (Rosaceae), 3♀ (CAFA). *Nevada Co.:* 8 mi S of Grass Valley, May 16, 1930, E. P. Van Duzee, 1♀ (CAS). *Orange Co.:* Santiago Canyon, April 2, 1935, E. L. Paddock, *Ceanothus megacarpus* (Rhamnaceae), 14♂, 5♀ (USNM). Santiago Canyon, April 2, 1936–April 14, 1935, E. L. Paddock, *Ceanothus megacarpus* (Rhamnaceae), 2♂ (CNC). *Riverside Co.:* Menifee Valley (hills on W end), February 28, 1985–April 20, 1978, J. D. Pinto, *Ceanothus crassifolius* (Rhamnaceae), 51♂, 50♀ (UCR). Milepost 29 on Rt 243, April 21, 1980, M. D. Schwartz and L. Russell, *Cercocarpus* sp. (Rosaceae), 7♂, 3♀ (OSU). North Fork of San Jacinto River, San Jacinto Mts., Hwy 74, February 29, 1976, A.

J. Mayor, *Ceanothus cuneatus* (Rhamnaceae), 7♂, 3♀ (UCR). NW of Murietta, road to Tenaja Fire Station, May 13, 1978, J. D. Pinto, 1♂ (UCR). San Jacinto Mountains, jct of Poppet Flat Rd and Rt 243, 1270 m, May 20, 2000, M. D. Schwartz, *Cercocarpus* sp. (Rosaceae), 1♀ (CNC). *Sacramento Co.:* Fair Oaks, April 5, 1931, H. H. Keifer, 1♂ (CAFA). *Santa Barbara Co.:* Santa Cruz Island, Prisoners Harbor, February 5, 1979, J. Powell, *Ceanothus insularis* (Rhamnaceae), 2♂, 2♀ (UCB). *San Benito Co.:* Hwy 25 S of Paicines, March 17, 1986, C. B. Barr, *Ceanothus* sp. (Rhamnaceae), 2♂ (LSU). Pinnacles National Monument, April 6, 1951, E. J. Taylor, 8♂, 6♀ (UCD). Pinnacles National Monument, April 6, 1951, E. J. Taylor, *Ceanothus cuneatus* (Rhamnaceae), 1♀ (CAFA). *San Bernardino Co.:* Cajon Pass, jct Rts I-15 and 138, 1030 m, May 2, 1985, R. T. Schuh and B. M. Massie, *Cercocarpus betuloides* (Rosaceae), 20♀ (AMNH). jct of Black Canyon and Cedar Canyon Roads, 3000 ft, May 18, 1982, M. D. Schwartz, *Prunus fasciculata* (Rosaceae), 15♂, 9♀ (AMNH). San Bernardino Mts. above Mountain Home, 440 m, May 11, 1978, R. T. Schuh and J. D. Pinto, 1♂ (AMNH). San Bernardino, March 6, 1973, E. L. Paddock, *Ceanothus* sp. (Rhamnaceae), 1♂ (CAFA). *San Diego Co.:* 2 mi SE of Santa Ysabel, May 5, 1983, J. D. Pinto, *Ceanothus* sp. (Rhamnaceae), 1♂, 2♀ (UCR). Cibbets Flat Campground on Kimball Creek Road, 1280 m, April 29, 1985, R. T. Schuh, *Ceanothus greggii* (Rhamnaceae), 10♂, 45♀ (AMNH). Decanso Junction on st. rt. 79, May 16, 1982, M. D. Schwartz, *Ceanothus integerrimus* (Rhamnaceae), 24♂, 24♀ (AMNH). Laguna Mountain Rd (Old Hwy 80) just SE of jct with Rt 8, 1180 m, May 21, 2000, M. D. Schwartz *Prunus fasciculata*, 1♀ (CNC). McCain Valley, May 3, 1980, Brown and Faulkner, 2♀ (SDNH). Mt. Laguna, June 21, 1963, J. Powell, 1♂ (UCB). No specific locality, April 6, 1913–May 12, 1913, E. P. Van Duzee, 7♂, 20♀ (CAS). Otay Mountain, May 18, 1978, D. K. Faulkner, 6♂, 6♀ (SDNH). Pine Valley, 1190 m, April 29, 1985, R. T. Schuh and B. M. Massie, *Ceanothus integerrimus* (Rhamnaceae), 15♂, 15♀ (AMNH). *San Luis Obispo Co.:* 5 mi NS of Santa Margarita, May 16, 1980, J. D. PInto, 1♂, 2♀ (UCR). Atascadero, April 23, 1951, R. M. Bohart, 1♂ (UCD). Nacimiento Dam, April 14, 1967, P. A. Rude, 1♂, 1♀ (UCB). *Santa Barbara Co.:* 3 mi N of San Marcos Pass, Los Padres Natl. Forest, March 21, 1996, A. R. Gillogly, *Ceanothus* sp. (Rhamnaceae), 3♀ (TAMU). Los Prietos, March 14, 1967, P. A. Opler, 8♂, 11♀ (UCB). Santa Cruz Island, Avalon Canyon, March 31, 1968, J. Powell, 3♂ (UCB). Santa Cruz Island, Central Valley, April 23, 1976, J. D. Pinto, *Cercocarpus* sp. (Rosaceae), 22♂, 8♀ (UCR). Santa Cruz Island, Pebbly Beach Canyon, March 31, 1968, P. A. Opler, 2♂, 2♀ (UCB). Santa Cruz Island, UC Station Headquarters, February 3, 1979, J. Powell, 2♂ (UCB). Santa Cruz Island, Upper Central Valley, 1000 ft, March 15, 1969, P. A. Opler, *Ceanothus arboreus* (Rhamnaceae), 3♂ *Santa Clara Co.:* 5 mi E of San Jose, Alum Rock Park, May 16, 1962, J. Doyen, 1♂ (UCB). Americh Road, April 21, 1996, M. Isaak, 1♂ (USNM). South end of Mines Road, 2350 ft, April 23, 1972, H. B. Leech, *Ceanothus cuneatus* (Rhamnaceae), 3♂, 1♀ (CAS). Stanford University Campus, April 29, 1928, R. L. Usinger, 2♀ (CNC). *Santa Cruz Co.:* 2 mi E of Soquel at Bates Creek, May 2, 1971, J. Doyen, 2♂ (UCB). Felton, June 12, 1952, W. H. Lange, 1♂ (UCD). *Shasta Co.:* 12 mi W of Whiskeytown, May 14, 1997, W. F. Chamberlin, 1♂, 2♀ (TAMU). 7 mi S of Cottonwood, May 1, 1971, P. W. Oman, 1♀ (OSU). Castle Crag, June 25, 1939, Schuh and Gray, 1♀ (OSU). Hat Creek, May 11, 1944, W. F. Chamberlin, *Ceanothus* sp. (Rhamnaceae), 1♂ (TAMU). *Siskiyou Co.:* 1 mi SE of Bartle, June 8, 1974, J. Doyen, 1♂ (UCB). *Tehama Co.:* 0.3 mi N of Red Bluff, 304 ft, April 14, 1981, M. D. Schwartz, *Quercus* sp. (Fagaceae), 1♂, 7♀ (AMNH). Red Bluff, Dog Island State Park, April 29, 1984, D. S. Chandler, 3♂, 1♀ (UNHAMP). *Tulare Co.:* 10 mi S of Fairview, May 2, 1964, C. A. Toschi, 1♂ (UCB). 10.3 mi N of Lemon Cove on J21, March 25, 1981, M. D. Schwartz, *Ceanothus integerrimus* (Rhamnaceae), 16♂, 5♀ (AMNH). 5.7 mi N of Kernville, Hospital Flat Campground, April 29, 1978, J. D. Pinto, *Ceanothus* sp. (Rhamnaceae), 5♂, 5♀ (UCR). 9 mi S of Fairview, April 30, 1964, R. L. Langston, 2♂, 2♀ (AMNH). Potwisha, 3 mi NE Ash Mountain Headquarters, May 3, 1979, J. A. DeBenedictis, 1♂ (UCB). Sequoia National

Park, May 29, 1949, W. D. Pierce, *Ceanothus* sp. (Rhamnaceae), 3♀ (LACM). *Tuolumne Co.:* 10 mi E of Buck Meadows, May 11, 1997, W. F. Chamberlin, 1♂, 1♀ (TAMU). Sonora, May 23, 1930, E. P. Van Duzee, 1♂ (CAS). *Ventura Co.:* 2 mi E of Lake Sherwood, March 16, 1967, P. A. Opler, 1♂ (UCB). Casitas Reserve, N end, March 15, 1967, P. A. Opler, 1♂, 5♀ (UCB). Ojai, April 24, 1935, C. E. Norland, 1♂ (LACM). Westlake Village, May 16, 1964, E. L. Paddock, 1♀ (CAFA). *Yolo Co.:* Putah Canyon, April 3, 1960, D. R. Miller, 1♂ (UCD). *Yuba Co.:* Dry Creek, Spenceville Wildlife Area, May 6, 1980, J. A. Powell, 2♂ (UCB). **Colorado:** *Mesa Co.:* Colorado National Monument, Liberty Cap Trailhead, 6000 ft, June 10, 1982, M. D. Schwartz, *Cercocarpus montanus* (Rosaceae), 7♂, 51♀ (AMNH). **Nevada:** *Elko Co.:* Ruby Mts., Lomoille Canyon, E of Powerhouse Picnic Area, 6000 ft, June 16, 1983, R. T. Schuh and M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 8♂, 18♀ (AMNH). *Washoe Co.:* Verdi, July 9, 1967, W. Gagne, 1♂ (UCD). *White Pine Co.:* 8.3 mi N of Hwy 50 on Steptoe Creek Rd, 7580 ft, July 19, 1980, G. M. Stonedahl, *Cercocarpus ledifolius* (Rosaceae), 20♀ (OSU). Wheeler Peak Road W of Baker, Humboldt Natl. Forest, 2609 m, July 14, 1980, R. T. Schuh and G. M. Stonedahl, *Cercocarpus ledifolius* (Rhamnaceae), 44♂, 81♀ (AMNH). **New Mexico:** *Sandoval Co.:* East Fork Jemez River, La Concha Campground, 8300 ft, August 14, 1972, R. E. Orth, 1♂ (UCR). **Oregon:** *Harney Co.:* 11 mi E of Frenchglen, 6000 ft, July 16, 1957, J. D. Lattin, *Cercocarpus sp*. (Rosaceae), 1♀ (OSU). *Josephine Co.:* 12 mi W of Cave Junction, June 12, 1979, R. T. Schuh, *Ceanothus integerrimus* (Rhamnaceae), 1♀ (AMNH). *Wheeler Co.:* 4.5 mi S of Mitchell on Summit Prairie Road, June 22, 1979, M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 5♂, 15♀ (OSU). 4.5 mi S of Mitchell on Summit Prairie Road, June 22, 1979, R. T. Schuh, *Cercocarpus ledifolius* (Rosaceae), 13♂, 13♀ (AMNH). **Utah:** *Cache Co.:* 5 mi NE of Logan, Green Canyon (trail), T12N R2E Sec. 21, 6000–6500 ft, July 3, 1982, M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 6♂, 7♀ (AMNH). Green Canyon Trail, 6500 ft, June 27, 1980, M. D. Schwartz, *Cercocarpus betuloides* (Rosaceae), 5♂, 8♀ (OSU). *Carbon Co.:* 8 mi NE of Helper, Price Canyon Rec. Area, T12E R9E, 8000 ft, July 9, 1982, M. D. Schwartz, *Cercocarpus ledifolius* (Rosaceae), 3♂, 1♀ (AMNH). *San Juan Co.:* 27 mi E of Blanding at MP 101 on Rt 95 near Mule Tower Ruins, 6500 ft, June 12, 1982, M. D. Schwartz, *Shepherdia rotundifolia* (Elaeagnaceae), 2♂ (AMNH). Natural Bridges National Monument (at campground), 6500 ft, June 17, 1983, R. T. Schuh and M. D. Schwartz, *Shepherdia rotundifola* (Elaeagnaceae), 15♀ (AMNH). Natural Bridges National Monument, May 29, 1985, J. T. and D. A. Polhemus, *Shepherdia canadensis* (Elaeagnaceae), 16♂, 17♀ (JTP). Natural Bridges National Park, T36, 37E R17, 18E, 6300 ft, June 12, 1982, M. D. Schwartz, *Cercocarpus montanus* (Rosaceae), 11♀ (AMNH). *Sevier Co.:* 2.3 mi N of I-70 on road to Kanosh, 6980 ft, July 16, 1980, G. M. Stonedahl, *Cercocarpus ledifolius* (Rosaceae), 2♀ (OSU). Dog Spring Rd at Rt 25, 2719 m, July 16, 1980, R. T. Schuh and G. M. Stonedahl, *Cercocarpus ledifolius* (Rhamnaceae), 11♂, 23♀ (AMNH). Jct Mytoge Mtn Rd and Hwy 25, 8850 ft, July 16, 1980, G. M. Stonedahl, *Cercocarpus ledifolius* (Rosaceae), 6♀ (OSU). *Uintah Co.:* 5–10 mi SW Bonanza, 5000–5600 ft, May 14, 1981, M. D. Schwartz, 1♀ (AMNH).

Tuxedo drakei, new species
Figures 1, 2

HOLOTYPE: Male: ‘‘USA: CALIF.: San Bernardino Co., 2 mi E of Wrightwood on Rt 2, 1563 m, June 30, 1980, R. T. Schuh; ex *Fremontodendron californicum* (Torr.) Cov. ssp. *californicum*, det. B. Ertter 1980 (Sterculiaceae).’’ Deposited in the American Museum of Natural History.

DIAGNOSIS: Recognized by the relatively small size in combination with the pale antennae, the extensive cream-colored fascia reaching to R-M, the hind femur castaneous on distal one-half (fig. 1), and the habit of breeding on *Fremontodendron*. Most similar in appearance to *T. bicinctus* and *T. susansolomonae*, but distinguished from *bicinctus* by the entirely castanaeous hind femur in that species, and from both by size differences, as well as the different host preferences. Vesica in male also distinctive, with a single,

short, bifid apical spine very similar in form to that found in *bicinctus* (fig. 2), but readily distinguished from that species through comparison of the overall form of the vesica.

REDESCRIPTION: *Male:* Moderately small; total length 3.01–3.22, length apex clypeus–cuneal fracture 2.06–2.19, width pronotum 0.98–1.06. COLORATION (fig. 1): Background coloration castaneous; basal one-third to one-half of cuneus creamy white; clavus always with a broad, pale area just posterior to apex of scutellum, extending onto adjacent corium and forming a more-or-less continuous, pale, transverse fascia reaching to R-M vein; antennal segments 1–4 entirely pale; labium almost entirely pale; legs, including coxae pale, except distal one-half of hind femora castaneous. SURFACE AND VESTITURE (fig. 1): Dorsum moderately shining. STRUCTURE: Body appearing somewhat flattened. GENITALIA (fig. 2): Body of vesica relatively stout in comparison to most other *Tuxedo* spp., most similar in this respect to *Tuxedo bicinctus*, but longer and with a more open curve than found in that species; vesica with a single, bifid apical spine extending only short distance beyond secondary gonopore and not extending beyond envelope of vesica, form very similar to that of *T. bicinctus*; vesical spine in *T. cruralis* also of similar appearance, but longer and curving, and vesica not so stout in that species.

Female: Small; total length 2.82–3.22, length apex clypeus–cuneal fracture 2.0–2.33, width pronotum 1.00–1.06. COLORATION (fig. 1): As in male. SURFACE AND VESTITURE: As in male. STRUCTURE: As in generic description.

ETYMOLOGY: This species in named for Carl J. Drake who collected the first known specimens of the taxon at Fresno, California.

HOST: Known only from *Fremontodendron californicum* (Torr.) Cov. (Sterculiaceae).

DISTRIBUTION: Southern California.

DISCUSSION: This is the taxon that Knight (1929) identified as *Microphyllelus bicinctus* (Van Duzee). My analysis shows, however, that it is larger than *bicinctus*, contrary to Knight's assertions. As noted by Knight, *drakei* apparently does have a different host than *bicinctus*, the latter having been documented through numerous collections to breed most frequently on *Ceanothus* spp. and *Cercocarpus* spp. *Tuxedo drakei*, on the other hand, is so far known to breed only on *Fremontodendron californicum*.

PARATYPES: USA: **California:** *Fresno Co.:* Fresno, July 20, 1926, C. J. Drake, 4♂, 11♀ (USNM). *Kern Co.:* near Kernville, Headquarters Camp, Sequoia National Forest, May 10, 1997–June 18, 1993, W. F. Chamberlin, 4♂, 3♀ (TAMU). *San Bernardino Co.:* 2 mi E of Wrightwood on Rt 2, 1563 m, June 26, 1980, R. T. Schuh, *Fremontodendron californicum* (Sterculiaceae), 68♂, 88♀ (AMNH, USNM), holotype male (AMNH). Camp Baldy, August 8, 1950, W. C. Bentinck, 1♂ (UCB). Camp Baldy, June 12, 1916, L. J. Muchmore, *Fremontodendron* sp. (Sterculiaceae), 1♂, 2♀ (UCB). *Ventura Co.:* Ozena Camp, 3500 ft, July 4, 1961, W. E. Simmons, *Fremontia* sp. (Sterculiaceae), 1♀ (UCB).

***Tuxedo elongatus*, new species**
Figures 1, 2

HOLOTYPE: Male: "[USA:] CALIFORNIA: Siskiyou Co., 6.9 mi S of Medicine Lake on Powder Hill Road, 19 July 1985 collectors GM Stonedahl & JD McIver; ex: *Castanopsis chrysophylla* (Fagaceae)." Deposited in the American Museum of Natural History.

DIAGNOSIS: Recognized by the extremely elongate form of the hemelytra (fig. 1), and distinguishable from all other *Tuxedo* species on that basis. Antennae pale, or nearly so (fig. 1). Form of the male genitalia most similar to *nicholi* with two apical spines pointing in opposite directions (fig. 2), but separated from that species by the lack of ornament on the left-hand spine, and more readily by the graphic differences in coloration and general conformation.

DESCRIPTION: *Male:* Elongate, very slender; total length 3.44–3.74, length apex clypeus–cuneal fracture 2.23–2.35, width pronotum 0.84–0.87. COLORATION (fig. 1): Background coloration weakly castaneous; basal one-third to one-half of cuneus creamy white; clavus always with a rounded pale area just posterior to apex of scutellum, sometimes broader and nearly parallel-sided and extending onto adjacent corium and

forming a more-or-less continuous, pale, transverse fascia reaching to R-M; antennal segments 1–4 yellow to weakly reddish; labial segments 2 and 3 pale; all coxae, fore- and middle femora, and all tibiae pale; hind femora castaneous on at least distal half. SURFACE AND VESTITURE (fig. 1): Pronotum highly polished and shining, remainder of dorsum very weakly shining. STRUCTURE: Body appearing somewhat flattened; hemelytra greatly elongated, particularly cuneus, extending well past apex of abdomen. GENITALIA (fig. 2): Body of vesica strongly curving basally; vesica with two apical spines, both curving and pointing in opposite directions, extending well beyond secondary gonopore and envelope of vesica, of general form most similar to that of *nicholi*, but left spine in that species bifid apically and with serrate shaft.

Female: Small; total length 2.47–2.66, length apex clypeus–cuneal fracture 1.68–1.76, width pronotum 0.77–0.84. COLORATION (fig. 1): As in male, except transverse fascia at apex of scutellum always broad and intense on clavus, always complete and extending to and including costal vein. SURFACE AND VESTITURE: As in male. STRUCTURE: As in generic description.

ETYMOLOGY: Named for the very elongate hemelytra in the males.

HOSTS: *Castanopsis chrysophylla* A. DC. and *Quercus* sp. (Fagaceae).

DISTRIBUTION: Northern Oregon south though eastern California to northern Arizona.

DISCUSSION: This is the only species of *Tuxedo* in which the males have extremely elongate hemelytra. The females show no such elongation and are extremely difficult to separate from other small species such as *T. bicinctus* and *T. drakei*.

PARATYPES: USA: **Arizona:** *Coconino Co.:* 3.5 mi S of Sedona on Rt 179, T17N R6E Sec. 30, 4200 ft, June 15, 1983, R. T. Schuh and M. D. Schwartz, *Quercus* sp. (Fagaceae), 3♂, 44♀ (AMNH). *Mohave Co.:* Hualapi Mts., SE of Kingman, T20N R15W, 4000–6400 ft, June 9, 1983, R. T. Schuh, M. D. Schwartz, and G. M. Stonedahl, *Quercus* sp. (Fagaceae), 1♀ (AMNH). **California:** *Plumas Co.:* Quiney, Johnsville, August 7, 1967, H. Pini, 1♂ (CAFA). *Siskiyou Co.:* 6.9 mi S of Medicine Lake on Powder Hill Road, July 19, 1985, G. M. Stonedahl and J. D. McIver, *Castanopsis chrysophylla* (Fagaceae), 8♂, 11♀ (AMNH, USNM), holotype male (AMNH). **Oregon:** *Deschutes Co.:* Black Butte, east side, 4850 ft, October 1, 1979, J. D. Lattin, *Castanopsis chrysophylla* (Fagaceae), 3♀ (OSU). *Hood River Co.:* 6 mi S of Parkdale, T1S R10E Sec. 31, 3320 ft, August 23, 1978, J. D. Lattin, 6♀ (OSU). T2S R10E Sec. 32, 3500 ft, September 13, 1979, J. D. Lattin, 1♀ (OSU).

Tuxedo flavicollis (Knight)
Figures 1, 2

Microphylellus flavicollis Knight, 1929: 43 (n.sp.).
Tuxedo flavicollis: Schuh, 2001: 252 (n.comb.).

HOLOTYPE: Female: ‘‘Tampico, Wash., May 10, 1926, E. W. Davis Coll.’’ Deposited in the National Museum of Natural History, Washington, D.C.

DIAGNOSIS: Recognized by the relatively large size, uniformly dark coloration of the dorsum, except for the pale base of the cuneus (fig. 1); males rarely with a faint marking on the clavus. Apical vesical spine in the male genitalia with a distinct tooth (fig. 2). Most similar in appearance to dark-colored specimens of *susansolomonae*, but distinguished from that species by the larger size and the distally infuscate fore- and middle femora, with only the hind femora being darkened in *susansolomonae*.

DESCRIPTION: *Male:* Relatively large; total length 3.32–3.84, length apex clypeus–cuneal fracture 2.33–2.71, width pronotum 1.01–1.21. COLORATION (fig. 1): Background coloration castaneous; basal one-third to one-half of cuneus creamy white; clavus infrequently with a rounded pale area just posterior to apex of scutellum, but always of limited extent and never forming a transverse fascia; antennal segments 1–4 entirely black; entire labium infuscate; all coxae pale, all femora pale proximally and infuscate on distal one-third to one-half, all tibiae weakly to strongly infuscate. SURFACE AND VESTITURE (fig. 1): Pronotum moderately shining, remainder of dorsum weakly shining. STRUCTURE: Body moderately rounded and convex in dorsal view. GENITALIA (figs. 2, 5H):

Body of vesica with broad, open curve at base; vesica with a single apical spine extending well beyond secondary gonopore and envelope of vesica, spine relatively broad and with a distinct subapical tooth.

Female: Relatively large; total length 3.23–3.48, length apex clypeus–cuneal fracture 2.19–2.43, width pronotum 1.04–1.22. COLORATION (fig. 1): Background coloration of dorsum frequently castaneous, as in male, but always with cunei creamy-white on basal one-third to one-half and with transverse fascia at apex of scutellum always broad and complete, extending to and including costal margin of wing; pronotum sometimes with a broad, pale brown or yellowish band across posterior lobe, in which case hemelytra ranging from faded castaneous to pale brown; all antennal segments, and legs, including coxae, pale except for castaneous distal half of hind femur. SURFACE AND VESTITURE: As in male. STRUCTURE: As in generic description.

HOST: Known from *Quercus* spp. (Fagaceae).

DISTRIBUTION: Eastern Washington south to San Luis Obispo County, California.

DISCUSSION: Schuh (2001) noted that it is unfortunate that the holotype of *T. flavicollis* from Tampico, Washington (near Yakima), is a female and in poor condition. Subsequent to writing that statement other material from H. H. Knight's collection has come to light, also collected at Tampico, Washington. Included is one male with the same collection data as the holotype female, and three males and one female collected by A. R. Rolfs on May 21, 1932. None of these specimens has host data. The Rolfs specimens bear identification labels that read ''*Plagiognathus cruralis* Van D. Det. H. H. Knight.'' There is no date on the ID labels, so it impossible to know when Knight made the determinations; however, the style of the locality and ID labeling is more modern than that for the material collected by E. W. Davis on which the original description of *Microphyllelus flavicollis* was based, so I would conclude that the *cruralis* identifications postdate the publication of the description of *T. flavicollis*.

It is my opinion that all of the specimens from Tampico, Washington, referred to above represent *T. flavicollis*. This judgment is based on the similarity in appearance of the female holotype of *flavicollis* and the female specimen collected by Rolfs. The dimensions of these specimens are also very similar: holotype (measurements from Knight, 1929)—total length 3.40, width head 0.78, width vertex 0.37; Rolfs female—total length 3.43, width head 0.77, width vertex 0.37. The specimens from Tampico, Washington are among the largest of all known *Tuxedo* specimens. A substantial amount of material of similar dimension is known from central California, especially from the coastal counties with labels indicating collection on *Quercus* spp. In the north, specimens in this size range are known from Hood River County, Oregon, and from Tampico, Yakima County, Washington. The male genitalia of the Tampico specimens are very similar to the large specimens from California (fig. 2), and differ consistently from the much more widely distributed, commonly-collected, and consistently smaller oak feeder I am calling *susansolomonae,* new species (see fig. 2).

SPECIMENS EXAMINED: USA: **California:** *Alameda Co.:* 10 mi E of Livermore, Tesla Road, April 18, 1962, J. Doyen, 1♂, 1♀ (UCB). *Butte Co.:* Chico, April 28, 1922, E. P. Van Duzee, *Quercus* sp. (Fagaceae), 1♂, 11♀ (CAS). Oroville, April 27, 1927, H. H. Keifer, *Quercus lobata* (Fagaceae), 3♀ (CAFA, CAS). Oroville, April 29, 1927, H. H. Keifer, *Quercus lobata* (Fagaceae), 2♀ (USNM). *Calaveras Co.:* Altaville, May 4, 1961, W. E. Simonds, 1♂ (CAFA). *Contra Costa Co.:* Concord, April 17, 1963, R. M. Brown, 5♂, 2♀ (CAS). Russellman Park, May 14, 1955, H. B. Leech, 1♀ (CAS). Walnut Creek (San Ramon Cr.), April 7, 1968, J. Powell, *Quercus lobata* (Fagaceae), 1♂, 1♀ (UCB). Walnut Creek, foot of Shell Ridge, April 22, 1962, J. Powell, 21♂ (UCB). *Kern Co.:* Tehachapi Mts., 4200–5200 ft, May 15, 1976, N. J. Reimer, 1♂ (UCB). *Lake Co.:* Little Borax Lake, May 9, 1951, J. D. Lattin, 1♀ (OSU). Lower Lake, May 18, 1922, E. P. Van Duzee, 1♀ (CAS). Middletown, April 9, 1970, P. W. Wiard, 3♂ (CAFA). *Mendocino Co.:* 5 mi N of Branscomb, May 25, 1976, S. Szerlip, *Quercus* sp. (Fagaceae), 4♂, 7♀ (UCB). Hopland Experiment Station, 2500–2800 ft, May 14, 1977, K. Yagi, 3♂, 5♀ (CAS). *Merced Co.:* 5 mi S of Hilmar, April

22, 1956, J. I. Stage, 1♂, 2♀ (CAS). *Monterey Co.:* 5 air mi NE of Arroyo Seco Guard Station, 800 ft, May 4, 1975, P. Rude and E. Rogers, *Quercus douglasii* (Fagaceae), 5♂, 2♀ (CAS, UCB). 6 mi W of Greenfield, Wiley Ranch, 1200 ft, May 3, 1975, J. Powell and S. Szerlip, *Quercus douglasii* (Fagaceae), 10♂, 7♀ (UCB). Bryson, May 20, 1920, E. P. Van Duzee, 2♀ (CAS). Paraiso Springs, April 14, 1932, L. S. Slevin, 1♀ (CAS). Santa Lucia Memorial Camp, Lost Padres Natl. Forest, April 23, 1977, D. Wilder, 1♂ (CAS). *Placer Co.:* Auburn, May 19, 1967, T. A. Sears, 1♂ (UCD). *Sacramento Co.:* Andrus Island, March 31, 1931, Rosaceae, 1♀ (CAFA). Arcade Creek, April 2, 1934, H. H. Keifer, *Quercus* sp. (Fagaceae), 1♀ (CAFA). Fair Oaks, April 15, 1933, H. H. Keifer, *Quercus wizlenzii* (Fagaceae), 4♂ (CAFA). Sacramento, April 9, 1930, H. H. Keifer, *Quercus* sp. (Fagaceae), 3♀ (CAFA). *San Luis Obispo Co.:* E of Arroyo Grande, Huasna Valley, Avenales Guard Station Jct., 840 ft, May 9, 1985, R. T. Schuh and B. M. Massie, 1♂, 15♀ (AMNH). *San Mateo Co.:* Portola Valley, May 4, 1917, W. M. Giffard, 1♀ (CAS). *Santa Clara Co.:* Stanford University, April 16, 1915, 1♂, 1♀ (USNM). *Santa Cruz Co.:* No specific locality, June 7, 1917, W. M. Giffard, 1♂ (USNM). *Shasta Co.:* Redding, April 14, 1968, R. P. Allen, 1♂ (CAFA). *Sonoma Co.:* Petaluma Marsh, April 24, 1980, J. T. Polhemus, 1♀ (JTP). *Stanislaus Co.:* Del Puerto Canyon, Frank Raines Park, 1200 ft, April 12, 1974, D. Green, 1♂ (UCB). *Tehama Co.:* 0.3 mi N of Red Bluff, 304 ft, April 14, 1981, M. D. Schwartz, *Quercus* sp. (Fagaceae), 2♂, 4♀ (AMNH). Red Bluff, jct Rts 36 and 15, April 26, 1980, L. Russell and M. D. Schwartz, *Quercus garryana* (Fagaceae), 2♀ (AMNH). *Ventura Co.:* Casitas Reserve, N end, March 15, 1967, P. A. Opler, 1♂ (UCB). *Yolo Co.:* Putah Canyon, April 6, 1957, J. Powell, *Quercus* sp. (Fagaceae), 1♂, 2♀ (UCB). **Oregon:** *Hood River Co.:* Hood River, May 21, 1893, 1♀ (CNC). **Washington:** *Yakima Co.:* Tampico, May 10, 1926, E. W. Davis, 1♂, holotype ♀. Tampico, May 21, 1932, A. R. Rolfs, 3♂, 1♀ (USNM).

Tuxedo nicholi (Knight)
Figures 1, 2

Microphylellus nicholi Knight, 1929: 42 (n.sp.).
Tuxedo nicholi: Schuh, 2001: 252 (n.comb.).

HOLOTYPE: Male: [USA]: "S. Catalina Mts., Alt. 3200, Ariz., Apr. 25, 1926, A. A. Nichol." Deposited in the National Museum of Natural History, Washington, D.C.

DIAGNOSIS: Recognized by the "faded" background coloration, the dorsum variably medium to pale brown (fig. 1) and unlike castaneous background coloration in all other known species. Apical vesical spines most similar in form to those of *elongatus* (fig. 2), but left spine in that species not bifid apically and lacking serrations on shaft.

DESCRIPTION: *Male:* Medium size; total length 2.84–3.07, length apex clypeus–cuneal fracture 1.86–2.10, width pronotum 0.84–0.93. COLORATION (fig. 1): Background coloration variably brownish to yellowish, not so strongly contrasting with pale areas as in other *Tuxedo* spp.; basal one-third to one-half of cuneus creamy white; clavus always with a pale area just posterior to apex of scutellum extending onto adjacent corium and forming a continuous, pale, transverse fascia reaching to and including costal vein; antennal segments 1 and 2 pale, segments 3 and 4 infuscate; labial segments 2 and 3 pale; legs, including coxae, pale, except hind femora weakly to moderately infuscate on distal one-half. SURFACE AND VESTITURE (fig. 1): Pronotum moderately shining, remainder of dorsum weakly shining. STRUCTURE: Body rounded and convex in dorsal view. GENITALIA (fig. 2): Vesica with two apical spines, both curving and pointing in opposite directions, extending well beyond secondary gonopore and surrounding envelope of vesica; left spine bifid apically and with serrate shaft; form of spines most similar to those of *nicholi*, but both spines in that species without ornament.

Female: Medium size; total length 2.64, length apex clypeus–cuneal fracture 1.82–2.00, width pronotum 0.90–0.97. COLORATION (fig. 1): Background coloration of dorsum partially to almost entirely yellowish; cuneus always creamy-white on basal one-third to one-half, castaneous distally; transverse fascia at apex of scutellum always broad and complete, extending to and including costal vein; antennal segments 1 and 2 pale, yellowish, segments 3 and 4 infuscate; coloration of legs as in male, except hind femur very weakly infuscate distally.

SURFACE AND VESTITURE: As in male. STRUCTURE: As in generic description.

HOSTS: *Quercus* spp. (Fagaceae).

DISTRIBUTION: Southern California east to Arizona and southern Utah.

DISCUSSION: *Tuxedo nicholi* is unique among its congeners in being largely brownish and/or yellowish. It nonetheless has all of the other diagnostic features of the group.

SPECIMENS EXAMINED: USA: **Arizona:** *Cochise Co.:* vicinity of Portal, 1500–1700 m, May 2, 1978–May 7, 1978, R. T. Schuh, *Quercus oblongifolia* (Fagaceae), 13♂, 8♀ (AMNH). *Maricopa Co.:* 4 Peaks Road, mile 6, April 25, 1983, J. T. Polhemus, *Quercus* sp. (Fagaceae), 1♀ (JTP). Salt River Canyon at Apache Lake, 2000 ft, April 26, 1981, D. A. and J. T. Polhemus, 8♂ (JTP). *Pima Co.:* 2 mi N of Molino Canyon Campground, Santa Catalina Mts., April 10, 1989, T. J. Henry and A. G. Wheeler, Jr., *Quercus* cf. *oblongifolia* (Fagaceae), 2♂, 2♀ (USNM). Sabino Canyon, Baboquivari Mountains, April 20, 1982, D. A. and J. T. Polhemus, *Quercus arizonica* (Fagaceae), 6♂, 1♀ (JTP). Santa Catalina Mountains, 2700 ft, May 5, 1926, A. A. Nichol, 2♂, 7♀ (USNM, CNC). Santa Catalina Mountains, Geology Vista Point, 2042 m, May 15, 2000, May 23, 2000, M. D. Schwartz, *Quercus hypoleucoides* (Fagaceae), 10♂, 45♀ (AMNH, CNC). Santa Catalina Mountains, Molino Basin Campground, April 8, 1989, T. J. Henry and A. G. Wheeler, Jr., *Quercus oblongifolia* (Fagaceae), 7♂, 7♀ (USNM). Tucson, May 12, 1929, E. D. Ball, 2♀ (USNM). Tucson, May 3, 1924, A. A. Nichol, 1♂, 1♀ (USNM). **California:** *Riverside Co.:* Deep Canyon, 8 mi N Jct Deep Cr. and Horsethief Cr., T7S R6E Sec. 6, 2960 ft, May 17, 1975, J. D. Pinto, 3♂ (UCR). Deep Canyon, Cactus Spring Trail between Hwy 74 and Horsethief Creek, May 31, 1975, J. D. Pinto, 4♂, 6♀ (UCR). Deep Canyon, Trail from Hwy 74, T7S R5E Sec. 1, 2960–3680 ft, May 1, 1976, J. D. Pinto, 16♂, 13♀ (UCR). Snow Creek, White Water, 1500 ft, April 6, 1955, W. R. Richards, 3♂, 2♀ (CNC). **Utah:** *Washington Co.:* Zion National Park, 7 mi NE St Rt 15 on Kolob Reserve Rd, 4000–5000 ft, May 25, 1981, M. D. Schwartz, *Quercus gambelli* (Fagaceae), 6♂, 8♀ (AMNH).

Tuxedo susansolomonae, new species
Figures 1, 2, 5

HOLOTYPE: Male: "USA: California: San Diego Co.: Cibbets Flat Cmpgrd on Kimball Crk Rd, 1280 m, April 29, 1985, R. T. Schuh; *Quercus agrifolia* var. *oxydenia* (Torr.) Howell, det. K. Nixon 1985 (Fagaceae)." Deposited in the American Museum of Natural History.

DIAGNOSIS: Recognized by the possession of a dark antennal segment 2 and a more-or-less complete cream-colored fascia on the hemelytra near the apex of the scutellum (fig. 1). Most similar in size and coloration of the antennae to *flavicollis*, but that species with at most a faint pale marking on the clavus instead of an extensive transverse fascia and with all femora infuscate distally rather than with fore- and middle femora pale as in *susansolomonae*. Vesica in *susansolomonae* distinctive for possessing two superposed, unornamented apical spines of unequal length (fig. 2).

DESCRIPTION: *Male:* Medium size; total length 2.86–3.26, length apex clypeus–cuneal fracture 1.94–2.25, width pronotum 0.84–1.01. COLORATION (fig. 1): Background coloration castaneous; basal one-third to one-half of cuneus creamy white; clavus always with a rounded pale area just posterior to apex of scutellum, sometimes broader and nearly parallel-sided and extending onto adjacent corium and forming a more-or-less continuous, pale, transverse fascia reaching to the R-M vein; antennal segments 1–4 usually entirely black, rarely not so dark; labial segments 2 and 3 pale; all coxae, fore- and middle femora, and all tibiae pale; hind femora ranging from castaneous on distal half to entirely castaneous. SURFACE AND VESTITURE (figs. 1, 5F): Pronotum moderately shining, remainder of dorsum weakly shining; ventral posterior surface of genital capsule with field of peglike spinules (fig. 5H). STRUCTURE: Body moderately elevated and convex in dorsal view; head as in figure 5A, C; meso- metathoracic pleuron as figure 5D; distal portion of dorsal surface of hind femur as figure 5G; claws as figure 5E. GENITALIA (fig. 2): Vesica with two apical spines extending well beyond secondary gonopore and envelope of vesica, anterior spine much longer than posterior and superposed over it, both spines slender,

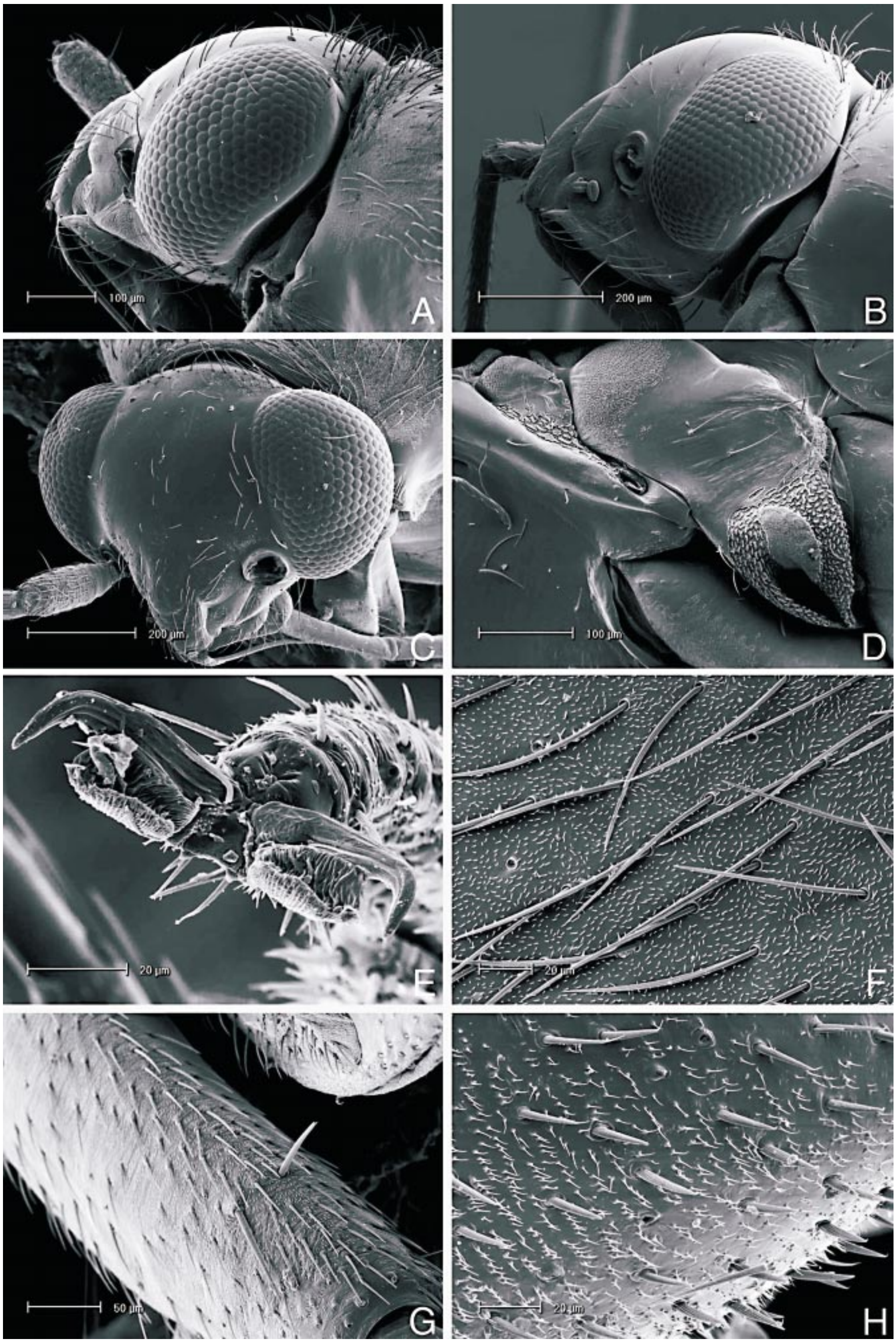


Fig. 5. Scanning electron micrographs of *T. susansolomonae* from USA: California: San Bernardino Co.: 0.9 mi W of Wrightwood. **A.** Head, ♂, lateral view. **B.** Head, ♀, lateral view. **C.** Head, ♂, anterior view. **D.** Mesothoracic spiracle and metaepisternal scent efferent system, lateral view. **E.** Pretarsus, frontal view. **F.** Setae on hemelytra. **G.** Hind femur, distal end, dorsal view. **H.** Genital segment, peglike setae on ventral surface, lateral view. Scales as indicated.

attenuated, and weakly bent near apex, without ornament.

Female: Medium size; total length 2.69–3.18, length apex clypeus–cuneal fracture 1.80–2.17, width pronotum 0.91–1.04. COLORATION (fig. 1): Background coloration of dorsum frequently castaneous, as in male, pronotum sometimes with a broad, pale brown or yellowish band across posterior lobe, in which case hemelytra ranging from faded castaneous to pale brown and scutellum sometimes reddish orange; cunei always creamy white on basal one-third to one-half; transverse fascia at apex of scutellum always broad and complete, extending to and including costal vein; all antennal segments pale, dull orange to yellowish; coloration of legs as in male. SURFACE AND VESTITURE: As in male. STRUCTURE (fig. 5B): As in generic description.

ETYMOLOGY: Named for Susan Solomon, wife of trustee Peter Solomon, of the American Museum of Natural History, in recognition of their generosity in funding the study of terrestrial arthropods at the Museum.

HOSTS: *Quercus* spp. (Fagaceae). Also known from *Lithocarpus* sp. (Fagaceae). The single record from *Prunus* sp. (Rosaceae) is almost certainly not a breeding host.

DISTRIBUTION: Southeastern Washington south to northern Baja California Norte, Mexico, east to central Arizona.

DISCUSSION: This is one of the most common species in the collections I have examined. Nonetheless, it seems to have remained undescribed, possibly because of its narrow host range on *Quercus* spp. and its appearance relatively early in the year.

PARATYPES: MEXICO: **Baja California Norte:** Tecate, 6.3 mi S of El Condor, 4000 ft, May 15, 1982, M. D. Schwartz, *Quercus chrysolepis* (Fagaceae), 1♂ (AMNH). USA: **Arizona:** *Gila Co.:* 2 mi W of Miami, 3800 ft, May 4, 1979, J. D. Pinto and E. M. Fisher, *Quercus sp*. (Fagaceae), 6♂, 8♀ (UCR). 8 mi SW jct Rts 87 and 188 (off Rt 87), Tonto Natl. Forest, 4000 ft, May 27, 1983, R. T. Schuh and G. M. Stonedahl, *Quercus turbinella* (Fagaceae), 1♀ (AMNH). *Maricopa Co.:* 4 Peaks Road, mile 6, April 25, 1983, J. T. Polhemus, *Quercus sp*. (Fagaceae), 7♂, 4♀ (JTP). *Mohave Co.:* SE of Kingman, T20N R15W, 4000–4400 ft, June 9, 1983, R. T. Schuh, M. D. Schwartz, and G. M. Stonedahl, *Quercus oblongifolia* (Fagaceae), 36♂, 42♀ (AMNH). *Navajo Co.:* 20 mi SW of Show Low, 5200–6000 ft, May 10, 1983, R. T. Schuh, G. M. Stonedahl, B. M. Massie, *Quercus arizonica* (Fagaceae), 18♂, 72♀ (AMNH). *Pima Co.:* Santa Catalina Mountains, near Bear Canyon Rd NE of Tuscson, 5500 ft, June 1, 1997, T. J. Henry and A. G. Wheeler, Jr., *Quercus* sp. (Fagaceae), 17♀ (USNM). Santa Catalina Mountains, Catalina Hwy near Willow Canyon Circle, 6500 ft, June 1, 1997, T. J. Henry and A. G. Wheeler, Jr., *Quercus* sp. (Fagaceae), 4♂, 6♀ (USNM). Santa Catalina Mountains, Mt. Lemon Rd, milepost 19, 7600 ft, June 12, 1983, R. T. Schuh and M. D. Schwartz, *Quercus reticulata* (Fagaceae), 18♂, 4♀ (AMNH). Santa Catalina Mountains, Windy Point Vista, 6300 ft, June 12, 1983, R. T. Schuh and M. D. Schwartz, *Quercus hypoleucoides* (Fagaceae), 15♀ (AMNH). Santa Catalina Mts., Catalina Hwy, 7 mi N of Molino Canyon Lookout, 5500 ft, June 1, 1997, T. J. Henry and A. G. Wheeler, Jr., *Quercus* sp. (Fagaceae), 7♂, 14♀ (USNM). Tucson, motel window, May 31, 1997, T. J. Henry and A. G. Wheeler, Jr., 1♂, 4♀ (USNM). *Yavapai Co.:* 15.8 mi S of Ash Fork on Rt 89, June 4, 1983, G. M. Stonedahl, *Quercus turbinella* (Fagaceae), 3♂, 50♀ (AMNH). **California:** *Butte Co.:* Oroville, April 29, 1927, H. H. Keifer, 1♀ (CAS). *El Dorado Co.:* 3.0–6.0 mi S of Camp Richardson on Angora Ridge and Fallen Leaf Roads, July 7, 1994, M. D. Schwartz, *Quercus chrysolepis* (Fagaceae), 3♂, 7♀ (CNC). Coloma, May 14, 1955, D. L. Dahlsten, 1♀ (UCD). *Glenn Co.:* 10 mi W of Elk Creek, June 7, 1984, J. D. Pinto, 1♀ (UCR). *Humboldt Co.:* 2 mi S of Honeydew, June 4, 1984, J. D. Pinto, *Lithocarpus* sp. (Fagaceae), 2♂, 4♀ (UCR). Harris, June 29, 1907, Bradley, 1♂ (USNM). *Inyo Co.:* 9 mi W of Rt 395 at Tulare Co. line near Chimney Peak Ranger Station, 2000 m, July 1, 1980, R. T. Schuh, *Quercus* sp. (Fagaceae), 32♂, 46♀ (AMNH). *Kern Co.:* 5 mi N of Kernville, May 15, 1963, J. Powell, *Quercus wizlenzii* (Fagaceae), 4♂, 11♀ (UCB). Lebec, 4000 ft, May 15, 1928, J. O. Martin, 1♂ (CAS). Lebec, Tejon Pass, 4000 ft, May 16, 1928, 1♂ (UCB). *Kings Co.:* 8 mi SSW of Avenal, T23S R16E, April

10, 1980, Andrews and Kuba, 1♀ (CAFA, UCB). *Lake Co.:* Middletown, April 9, 1970, H. W. Wiard, 1♀ (AMNH). *Los Angeles Co.:* 0.9 mi W of Wrightwood on Rt 2, 2031 m, June 30, 1980, R. T. Schuh, *Quercus* sp. (Fagaceae), 33♂, 44♀ (AMNH). 5 mi E of Saugus, Mint Canyon, April 20, 1932, E. P. Van Duzee, 1♀ (CAS). Glendora, May 3, 1937, C. E. Norland, 10♂, 3♀ (LACM). Oaks, Mint Canyon, April 20, 1932, E. P. Van Duzee, 2♀ (CAS). Pasadena, June 5, 1909, Grinnell, 3♂ (CAS). *Madera Co.:* 1.8 mi SE Rt 41 at Rt 274 and Pettit Rd, 3400 ft, May 22, 2001, T. J. Henry, *Quercus* sp. (Fagaceae), 13♂, 6♀ (USNM). *Maricopa Co.:* Salt River Canyon at Apache Lake, 2000 ft, April 28, 1981, D. A. and J. T. Polhemus, 3♂, (JTP). *Mariposa Co.:* Yosemite Valley, June 15, 1938, N. A. Olson, 1♀ (UCB). *Mendocino Co.:* 1 mi N of Pierce, May 20, 1976, R. Wharton, 1♀ (UCB). Hopland Field Station, Kelsey Cab. Orchard area, 2500–2800 ft, May 14, 1977, J. Yoakley and C. Nawalinski, *Quercus lobata* (Fagaceae), 2♂ (UCB). *Monterey Co.:* Paraiso Springs, April 18, 1932, L. S. Slavin, 1♀ (CAS). *Orange Co.:* Cleveland Natl. Forest, 1.5 mi E of San Juan Campground, 500 m, May 12, 1978, J. D. Pinto and R. T. Schuh, 2♀ (AMNH). Cleveland Natl. Forest, El Cariso Campground, 750 m, May 12, 1978, J. D. Pinto and R. T. Schuh, *Quercus* sp. (Fagaceae), 2♂, 19♀ (AMNH). *Placer Co.:* Tahoe, G Alpine Creek, July 5, 1915, E. P. Van Duzee, 2♂, 1♀ (UCB). *Riverside Co.:* 2 mi N of Poppet Flat on Rt 243, May 22, 1976, J. D. Pinto, *Quercus dumosa* (Fagaceae), 2♂, 8♀ (UCR). 3 mi W of Murrietta, Tenaja Road, 345 m, May 12, 1978, J. D. Pinto and R. T. Schuh, *Quercus agrifolia* (Fagaceae), 4♀ (AMNH). 4 mi W of Murrietta, 1800 ft, April 29, 1966, E. I. Schlinger, 1♀ (UCR). 6 mi W of Murietta, Santa Rosa Plateau Area, 625 m, May 1, 1985, R. T. Schuh and J. D. Pinto, *Quercus dumosa* (Fagaceae), 8♀ (AMNH). Cleveland Natl. Forest, el Cariso Campground on Hwy 74, 2500 ft, May 12, 1978, J. D. Pinto, *Quercus* sp. (Fagaceae), 9♂, (UCR). Menifee Valley (hills on W end), April 19, 1979, J. D. Pinto, 1♂, 4♀ (UCR). San Jacinto Mountains, June 30, 1933, R. H. Beamer, 1♂ (KU). San Jacinto Mountains, jct of Two Pines Rd and Rt 243, 1200 m, May 20, 2000, M. D. Schwartz *Quercus* sp. (Fagaceae), 3♀ (CNC). San Jacinto Mountains, Pinon Flat, May 21, 1941, R. L. Usinger, *Quercus chrysolepis* (Fagaceae), 5♀ (UCB). San Jacinto Mountains, San Jacinto River, 3000 ft, May 30, 1940, R. L. Usinger, *Quercus* sp. (Fagaceae), 10♀ (UCB). Tin Mine Canyon, April 6, 1968, P. A. Rauch, 1♂ (UCR). *Sacramento Co.:* Arcade Creek, April 2, 1934, H. H. Keifer, *Quercus* sp. (Fagaceae), 1♀ (CAFA). *San Benito Co.:* 2 mi NE of New Idria, April 24, 1964, J. Doyen, 3♂ (UCB). *San Bernardino Co.:* 1.5 mi N of Cajon Pass Summit on I-15, 1310 m, May 2, 1985, R. T. Schuh and B. M. Massie, 1♂, 9♀ (AMNH). 2 mi E of Camp Angelus, June 18, 1978, J. D. Pinto, 1♀ (UCR). 8 mi SE of Ivanpah, Lanfair Valley, May 25, 1977, Saul Frommer, 1♀ (UCR). 9 mi S of Hesperia, Mojave River Forks Recreation Area, 720 m, May 2, 1985, R. T. Schuh, *Quercus wizlenzii* (Fagaceae), 4♂, 63♀ (AMNH). *San Diego Co.:* 3.5 mi S of Henshaw Dam on S7, 1220 m, April 30, 1985, R. T. Schuh and B. M. Massie, *Quercus engelmanni* (Fagaceae), 2♂, 7♀ (AMNH). Boulder Oaks Campground on Old Hwy 80, 970 m, May 21, 2000, M. D. Schwartz, *Quercus* sp. (Fagaceae), 2♀ (CNC). Cibbets Flat Campground on Kimball Creek Road, 1280 m, April 29, 1985, R. T. Schuh, *Quercus agrifolia* (Fagaceae), 40♂, 13♀ (AMNH), holotype male (AMNH). Just above Henshaw Dam on S7, 900 m, April 30, 1985, R. T. Schuh and B. M. Massie, *Quercus dumosa* (Fagaceae), 9♂, 19♀ (AMNH). Just S of Santa Ysabel, 1060 m, April 30, 1985, R. T. Schuh and B. M. Massie, *Quercus agrifolia* (Fagaceae), 1♂, 13♀ (AMNH). Kimball Creek Road at Kimball Creek, 1190 m, April 29, 1985, R. T. Schuh and B. M. Massie, *Quercus agrifolia* (Fagaceae), 2♂, 2♀ (AMNH). Mt. Palomar, June 28, 1963, J. Powell, *Prunus emarginata* (Rosaceae), 1♀ (UCB). Oak Grove Campground, Cleveland Natl. Forest, April 22, 1980, M. D. Schwartz, *Quercus* sp. (Fagaceae), 10♂, 2♀ (AMNH). Oak Grove, Cleveland Natl. Forest, April 22, 1980, Russell and Schwartz, *Quercus* sp. (Fagaceae), 28♂, 17♀ (OSU). Pala, April 13, 1965, J. Powell, 1♂ (UCB). Palomar Mt., 3 mi up East Grade Road, May 17, 1979, Brown and Faulkner, 1♀ (SDNH). S1 at Old Rt. 80 N of Morena

Lake, 1000 m, April 29, 1985, R. T. Schuh and B. M. Massie, *Quercus agrifolia* (Fagaceae), 17♂, 25♀ (AMNH). Santa Rosa Mts., 6200 ft, May 31, 1940, R. L. Usinger, 6♂, 2♀ (UCB). *San Luis Obispo Co.:* 10.5 mi SE of Santa Margarita, May 16, 1980, J. D. Pinto, 1♂, 1♀ (UCR). 3 mi W of Paso Robles, April 28, 1968, D. Veirs, 2♂ (UCB). Avenales Guard Station Jct, Huasna Valley E of Arroyo Grande, 840 m, May 9, 1985, R. T. Schuh and B. M. Massie, *Quercus douglasii* (Fagaceae), 1♂, (AMNH). *Santa Barbara Co.:* Upper Oso Campground off Rt 154, 310 m, May 7, 1985, R. T. Schuh and B. M. Massie, *Quercus dumosa* (Fagaceae), 1♂, 10♀ (AMNH). *Tulare Co.:* 5.7 mi N of Kernville, Hospital Flat Campground, April 28, 1978, J. D. Pinto, *Quercus* sp. (Fagaceae), 1♂, 1♀ (UCR). 9 mi S of Fairview, April 30, 1964, R. L. Langston, *Quercus wizlenzii* (Fagaceae), 10♂, 8♀ (UCB). Woodlake, April 24, 1932, E. P. Van Duzee, 1♀ (CAS). *Ventura Co.:* Westlake Village, May 16, 1969, E. L. Paddock, *Quercus* sp. (Fagaceae), 5♀ (CAFA). Wheeler Hot Springs, Ojai, 1500 ft, May 20, 1954, Bryant, 3♀ (CAS). *Yolo Co.:* Rumsey, April 21, 1973, L. T. Wilson, 4♀ (UCD). **Oregon:** *Hood River Co.:* Hood River, May 21, 1893, 1♀ (USNM). *Jackson Co.:* Table Rock, May 18, 1960, Joe Schuh, 1♀ (OSU). *Josephine Co.:* just S of Rough and Ready Wayside S of Cave Junction, June 12, 1979, R. T. Schuh, *Quercus vaccinifolia* (Fagaceae), 6♀ (AMNH). *Klamath Co.:* Klamath Falls, Geary Ranch, June 22, 1956, Joe Schuh, 1♀ (OSU). *Wasco Co.:* Tyghe Valley, May 24, 1959, Joe Schuh, 1♀ (OSU). **Washington:** *Yakima Co.:* 5 mi W of Naches, 1500 ft, May 14, 1981, J. D. Lattin, *Quercus garryana* (Fagaceae), 3♀ (OSU).

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Institutional names, names of curators or other responsible individuals, and abbreviations for institutions from which material was borrowed are presented in the following list. To all of these organizations and individuals I express my thanks for making material available.

AMNH	American Museum of Natural History, New York
CAS	California Academy of Sciences, San Francisco, Paul Arnaud, Jr., Norman Penny
CAFA	California Department of Food and Agriculture, Sacramento, Alan Hardy
CNC	Canadian National Collection of Insects, Agriculture Canada, Ottawa, Michael Schwartz
CU	Cornell University, Ithaca, New York, James K. Liebherr
HELSINKI	University Zoological Museum, Helsinki, Larry Hulden
JTP	John T. Polhemus Collection, Englewood, Colorado
KU	University of Kansas, Snow Entomological Museum, Lawrence, Alex Slater
LACM	Natural History Museum of Los Angeles County, Julian P. Donahue
LSU	Louisiana State University, Baton Rouge, Victoria L. Moseley

OSU	Oregon State University, Corvallis, John D. Lattin
SDNH	San Diego Museum of Natural History, David K. Faulkner
TAMU	Texas A&M University, College Station, Joseph C. Schaffner, Ed Riley
UCB	University of California, Berkeley, John Chemsak
UCD	University of California, Davis, the late Robert Schuster
UCR	University of California, Riverside, the late Saul Frommer, John D. Pinto
UNHAMP	University of New Hampshire, Durham, Donald Chandler
USNM	Smithsonian Institution, United States National Museum of Natural History, Washington, D.C., Thomas J. Henry (USDA Systematic Entomology Laboratory)

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APPENDIX 1

Locality Data for Specimens Illustrated in figure 1

T. bicinctus—♂: USA: California: Santa Barbara County: Upper Oso Campground; ♀: USA: California: Modoc Co.: Fandango Pass Summit. *T. cruralis*—♂ 1: USA: California: San Diego Co.: Decano Jct. on Rt. 79; ♂ 2: USA: California: San Bernardino Co.: jct of Black Canyon and Cedar Canyon Rds; ♂ 3: USA: Colorado: Mesa Co.: Colorado National Monument, Liberty Cap Trailhead; ♀ 1: same data as ♂ 1; ♀ 2: same data as ♂ 2; ♀ 3: same data as ♂ 3. *T. drakei*—♂: USA: California: San Bernardino Co.: 2 mi E of Wrigthwood on Rt 2; ♀: same data as ♂. *T. elongatus*—♂: USA: California: Siskiyou Co.: 6.9 mi S of Medicine Lake on Powder Hill Rd; ♀: USA: Arizona: Coconino Co.: 3.5 mi S of Sedona on Rt 179. *T. flavicollis*—♂ 1: USA: California: Contra Costa Co.: Walnut Creek, foot of Shell Ridge; ♂ 2: USA: Washington: Yakima Co.: Tampico; ♀♀ 1 and 2: USA: California: San Luis Obispo Co.: Avenales Guard Station Jct, Huasna Valley. *T. nicholi*—♂: USA: Arizona: Cochise Co.: vicinity of Portal; ♀: USA: Arizona: Pima Co.: Santa Catalina Mts. *T. susansolomonae*—♂ 1: USA: California: San Diego Co.: Cibbets Flat Campground on Kimball Creek Rd; ♂ 2: USA: California: San Diego Co.: Oak Grove Campground; ♂ 3: USA: Arizona: Navajo Co.: 20 mi SW of Show Low; ♀ 1: same data as ♂ 1; ♀ 2: USA: California: Santa Barbara Co.: Upper Oso Campground off Rt 154; ♀ 3: same data as ♂ 3.